EXCEL-ARC® 500 and 6045
Transformer-Rectifier DC
Welding Machine

For the Following Specs:

- 100002A-1 500 CC, 50/60 Hz
- 100002A-2 6045 CV, 50/60 Hz
- 100002A-3 6045 CC/CV, 50/60 Hz

THERMAL ARC®

A THERMADYNE® Company

OWNER'S MANUAL Number **430429-409** (Rev - AB)
Revised May 1, 2000

IMPORTANT: Read these instructions before installing, operating, or servicing this system.

THERMAL ARC INC., TROY, OHIO 45373-1085, U.S.A.

DECLARATION OF CONFORMITY

Thermal Arc Inc.
2200 Corporate Drive
Troy, Ohio, USA 45373-1085

The equipment described in this manual, including all options and accessories to which this declaration relates is (are) in conformity with the following standard(s) or other normative document(s):

1) EMC Directive 89/336/EEC of 3 May 1989 as amended by 92/31/EEC of 28 April 1992 and 93/68/EEC of 22 July 1993 by meeting the provisions of EN50199 "EMC Product Standard for Arc Welding Equipment".

2) Low Voltage Directive 73/23/EEC of 19 February 1973 as amended by 93/68/EEC of 22 July 1993 by meeting the provisions EN60974-1 "Safety requirements for arc welding equipment Part 1: Welding Power Sources" (IEC-974-1:1989) and the Draft Revision IEC-974-1 of October 1996.

Manufacturer's Responsible
Representative

David Ashworth
Vice President & Managing Director
Thermadyne Europe
Chorley, England

CE

INTRODUCTION 1
How To Use This Manual . . . 1-1
Equipment Identification . . . 1-1
Receipt Of Equipment . . . 1-1
Meanings Of Markings And Graphical Symbols: . . . 1-1

ARC WELDING SAFETY INSTRUCTIONS AND WARNINGS 2

DESCRIPTION OF EQUIPMENT 3
General . . . 3-1
Recommended Unit Applications . . . 3-1
Wire Feeder Compatibility . . . 3-1
Controls and Outlets . . . 3-3
Duty Cycle . . . 3-5

INSTALLATION 4
Location . . . 4-1
Grounding . . . 4-1
Internal Wiring Check . . . 4-2
Connecting Welding Machine to Line Voltage . . . 4-2
Welding Leads . . . 4-3

OPERATION 5
General . . . 5-1
Preweld Operation . . . 5-1
SMAW (Stick) Welding, Carbon Arc Gouging . . . 5-1
Welding, Semiautomatic or Automatic . . . 5-1

MAINTENANCE 6
Replacing SCRs . . . 6-1
Lubrication . . . 6-1
Inspection and Cleaning . . . 6-1

TROUBLESHOOTING 7
Detailed Troubleshooting Instructions . . . 7-5

PARTS LIST 8
Equipment Identification . . . 8-1
How To Use This Parts List . . . 8-1

DIAGRAMS

INTRODUCTION

How To Use This Manual

This Owner's Manual usually applies to just the underlined specification or part numbers listed on the cover. If none are underlined, they are all covered by this manual.

To ensure safe operation, read the entire manual, including the chapter on Safety Instructions and Warnings.

Throughout this manual, the words **WARNING**, **CAUTION**, and **NOTE** may appear. Pay particular attention to the information provided under these headings. These special annotations are easily recognized as follows:

WARNING gives information regarding possible personal injury. Warnings will be enclosed in a box such as this.

CAUTION refers to possible equipment damage. Cautions will be shown in bold type.

NOTE offers helpful information concerning certain operating procedures. Notes will be shown in italics.

Equipment Identification

The unit's identification number (specification or part number), model, and serial number usually appear on a nameplate attached to the control panel. In some cases, the nameplate may be attached to the rear panel. Equipment which does not have a control panel such as gun and cable assemblies are identified only by the specification or part number printed on the shipping container. Record these numbers for future reference.

Receipt Of Equipment

When you receive the equipment, check it against the invoice to make sure it is complete and inspect the equipment for possible damage due to shipping. If there is any damage, notify the carrier immediately to file a claim. Furnish complete information concerning damage claims or shipping errors to Thermal Arc, Order Department, 2200 Corporate Drive, Troy, Ohio 45373-1085. Include all equipment identification numbers as described above along with a full description of the parts in error.

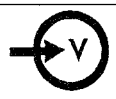
Move the equipment to the installation site before uncrating the unit. A lifting eye on the top of the case has been provided so that the equipment may be carried or lifted with a crane or hoist. Use care to avoid damaging the equipment when using bars, hammers, etc., to uncrate the unit.

WARNING: Falling machine due to lifting eye failure may cause death or serious injury.

- Lifting device may fail when overloaded.
- This lifting device is designed to lift the power source **ONLY**. If the machine is equipped with a trailer or accessories over 100 pounds, **DO NOT LIFT** by lifting eyes.
- Avoid sudden jerks, drops, or swinging.
- Check lifting device components visually for looseness and signs of metal fatigue.
- Before changing any hardware, check grade and size of bolts, and replace with bolts of equal or higher size and grade.

Additional copies of this manual may be purchased by contacting Thermal Arc at the address given above. Include the Owner's Manual number and equipment identification numbers.

Meanings Of Markings And Graphical Symbols:

	Output Control Increase/Decrease
	Circuit Breaker
	Input Voltage Switch
	Wire Feed
115V AC 10 AMPS 	Receptacle Rating For Auxiliary Power

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ARC WELDING SAFETY INSTRUCTIONS AND WARNINGS

⚠ WARNING

ARC WELDING can be hazardous.

PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS KEEP AWAY UNTIL CONSULTING YOUR DOCTOR. DO NOT LOSE THESE INSTRUCTIONS. READ OPERATING/INSTRUCTION MANUAL BEFORE INSTALLING, OPERATING OR SERVICING THIS EQUIPMENT.

Welding products and welding processes can cause serious injury or death, or damage to other equipment or property, if the operator does not strictly observe all safety rules and take precautionary actions.

Safe practices have developed from past experience in the use of welding and cutting. These practices must be learned through study and training before using this equipment. Anyone not having extensive training in welding and cutting practices should not attempt to weld. Certain of the practices apply to equipment connected to power lines; other practices apply to engine driven equipment.

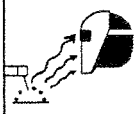
Safe practices are outlined in the American National Standard Z49.1 entitled: SAFETY IN WELDING AND CUTTING. This publication and other guides to what you should learn before operating this equipment are listed at the end of these safety precautions.

HAVE ALL INSTALLATION, OPERATION, MAINTENANCE, AND REPAIR WORK PERFORMED ONLY BY QUALIFIED PEOPLE.

ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

1. Do not touch live electrical parts.
2. Wear dry, hole-free insulating gloves and body protection.
3. Insulate yourself from work and ground using dry insulating mats or covers.
4. Disconnect input power or stop engine before installing or servicing this equipment. Lock input power disconnect switch open, or remove line fuses so power cannot be turned on accidentally.
5. Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
6. Turn off all equipment when not in use. Disconnect power to equipment if it will be left unattended or out of service.
7. Use fully insulated electrode holders. Never dip holder in water to cool it or lay it down on the ground or the work surface. Do not touch holders connected to two welding machines at the same time or touch other people with the holder or electrode.
8. Do not use worn, damaged, undersized, or poorly spliced cables.
9. Do not wrap cables around your body.
10. Ground the workpiece to a good electrical (earth) ground.
11. Do not touch electrode while in contact with the work (ground) circuit.
12. Use only well-maintained equipment. Repair or replace damaged parts at once.
13. In confined spaces or damp locations, do not use a welder with AC output unless it is equipped with a voltage reducer. Use equipment with DC output.
14. Wear a safety harness to prevent falling if working above floor level.
15. Keep all panels and covers securely in place.



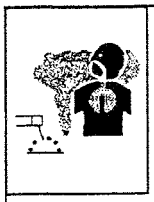
ARC RAYS can burn eyes and skin; NOISE can damage hearing.

Arc rays from the welding process produce intense heat and strong ultraviolet rays that can burn eyes and skin. Noise from some processes can damage hearing.

1. Wear a welding helmet fitted with a proper shade of filter (see ANSI Z49.1 listed in Safety Standards) to protect your face and eyes when welding or watching.
2. Wear approved safety glasses. Side shields recommended.
3. Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.
4. Wear protective clothing made from durable, flame-resistant material (wool and leather) and foot protection.
5. Use approved ear plugs or ear muffs if noise level is high.

Eye protection filter shade selector for welding or cutting (goggles or helmet), from AWS A6.2-73.

Welding or Cutting Operation	Electrode Size Metal Thickness or Welding Current	Filter Shade No.	Welding or Cutting Operation	Electrode Size Metal Thickness or Welding Current	Filter Shade No.
Torch soldering	—	2	Gas metal-arc welding (MIG)		
Torch brazing	—	3 or 4	Non-ferrous base metal	All	11
Oxygen cutting			Ferrous base metal	All	12
Light	Under 1 in., 25 mm	3 or 4	Gas tungsten arc welding (TIG)	All	12
Medium	1 to 6 in., 25-150 mm	4 or 5	Atomic hydrogen welding	All	12
Heavy	Over 6 in., 150 mm	5 or 6	Carbon arc welding	All	12
Gas welding			Plasma arc welding	All	12
Light	Under 1/8 in., 3 mm	4 or 5	Carbon arc air gouging		
Medium	1/8 to 1/2 in., 3-12 mm	5 or 6	Light		12
Heavy	Over 1/2 in., 12 mm	6 or 8	Heavy		14
Shielded metal-arc welding	Under 5/32 in., 4 mm	10	Plasma arc cutting		
(stick) electrodes	5/32 to 1/4 in., 4 to 6.4 mm	12	Light	Under 300 Amp	9
	Over 1/4 in., 6.4 mm	14	Medium	300 to 400 Amp	12
			Heavy	Over 400 Amp	14



FUMES AND GASES can be hazardous to your health.

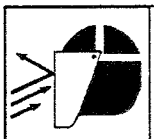
Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

1. Keep your head out of the fumes. Do not breath the fumes.
2. If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.
3. If ventilation is poor, use an approved air-supplied respirator.
4. Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instruction for metals, consumables, coatings, and cleaners.
5. Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Shielding gases used for welding can displace air causing injury or death. Be sure the breathing air is safe.
6. Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
7. Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.

WELDING can cause fire or explosion.

Sparks and spatter fly off from the welding arc. The flying sparks and hot metal, weld spatter, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode or welding wire to metal objects can cause sparks, overheating, or fire.

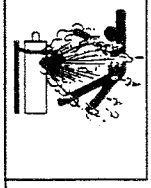
1. Protect yourself and others from flying sparks and hot metal.
2. Do not weld where flying sparks can strike flammable material.
3. Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
4. Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
5. Watch for fire, and keep a fire extinguisher nearby.
6. Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
7. Do not weld on closed containers such as tanks or drums.
8. Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock and fire hazards.
9. Do not use welder to thaw frozen pipes.
10. Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
11. Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.



FLYING SPARKS AND HOT METAL can cause injury.

Chipping and grinding cause flying metal. As welds cool, they can throw off slag.

1. Wear approved face shield or safety goggles. Side shields recommended.
2. Wear proper body protection to protect skin.



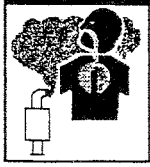
CYLINDERS can explode if damaged.

Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

1. Protect compressed gas cylinders from excessive heat, mechanical shocks, and arcs.
2. Install and secure cylinders in an upright position by chaining them to a stationary support or equipment cylinder rack to prevent falling or tipping.
3. Keep cylinders away from any welding or other electrical circuits.
4. Never allow a welding electrode to touch any cylinder.
5. Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
6. Turn face away from valve outlet when opening cylinder valve.
7. Keep protective cap in place over valve except when cylinder is in use or connected for use.
8. Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

⚠ WARNING

ENGINES can be hazardous.



ENGINE EXHAUST GASES can kill.

Engines produce harmful exhaust gases.

1. Use equipment outside in open, well-ventilated areas.
2. If used in a closed area, vent engine exhaust outside and away from any building air intakes.

ENGINE FUEL can cause fire or explosion.

Engine fuel is highly flammable.

1. Stop engine before checking or adding fuel.
2. Do not add fuel while smoking or if unit is near any sparks or open flames.
3. Allow engine to cool before fueling. If possible, check and add fuel to cold engine before beginning job.
4. Do not overfill tank — allow room for fuel to expand.
5. Do not spill fuel. If fuel is spilled, clean up before starting engine.

MOVING PARTS can cause injury.

Moving parts, such as fans, rotors, and belts can cut fingers and hands and catch loose clothing.

1. Keep all doors, panels, covers, and guards closed and securely in place.
2. Stop engine before installing or connecting unit.
3. Have only qualified people remove guards or covers for maintenance and troubleshooting as necessary.
4. To prevent accidental starting during servicing, disconnect negative (-) battery cable from battery.
5. Keep hands, hair, loose clothing, and tools away from moving parts.
6. Reinstall panels or guards and close doors when servicing is finished and before starting engine.

SPARKS can cause BATTERY GASES TO EXPLODE; BATTERY ACID can burn eyes and skin.

Batteries contain acid and generate explosive gases.

1. Always wear a face shield when working on a battery.
2. Stop engine before disconnecting or connecting battery cables.
3. Do not allow tools to cause sparks when working on a battery.
4. Do not use welder to charge batteries or jump start vehicles.
5. Observe correct polarity (+ and –) on batteries.

STEAM AND PRESSURIZED HOT COOLANT can burn face, eyes, and skin.

The coolant in the radiator can be very hot and under pressure.

1. Do not remove radiator cap when engine is hot. Allow engine to cool.
2. Wear gloves and put a rag over cap area when removing cap.
3. Allow pressure to escape before completely removing cap.

WARNING: This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Sec. 25249.5 et seq.)

NOTE: Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

The following is a quotation from the General Conclusions Section of the U.S. Congress, Office of Technology Assessment, Biological Effects of Power Frequency Electric & Magnetic Fields — Background Paper, OTA-BP-E-63 (Washington, DC: U.S. Government Printing Office, May 1989): "... there is now a very large volume of scientific findings based on experiments at the cellular level and from studies with animals and people which clearly establish that low frequency magnetic fields can interact with, and produce changes in, biological systems. While most of this work is of very high quality, the results are complex. Current scientific understanding does not yet allow us to interpret the evidence in a single coherent framework. Even more frustrating, it does not yet allow us to draw definite conclusions about questions of possible risk or to offer clear science-based advice on strategies to minimize or avoid potential risks."

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around the body.
4. Keep welding power source and cables as far away from body as practical.

About Pacemakers:

The above procedures are among those also normally recommended for pacemaker wearers. Consult your doctor for complete information.

PRINCIPAL SAFETY STANDARDS

Safety in Welding and Cutting, ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126.

Safety and Health Standards, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, American Welding Society Standard AWS F4.1, from American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126.

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

Safe Practices for Occupation and Educational Eye and Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting and Welding Processes, NFPA Standard 51B, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

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PRECAUTIONS DE SECURITE EN SOUDAGE A L'ARC

MISE EN GARDE — LE SOUDAGE A L'ARC EST DANGEREUX

PROTEGEZ-VOUS, AINSI QUE LES AUTRES, CONTRE LES BLESSURES GRAVES POSSIBLES OU LA MORT. NE LAISSEZ PAS LES ENFANTS S'APPROCHER, NI LES PORTEURS DE STIMULATEUR CARDIAQUE (A MOINS QU'ILS N'AIENT CONSULTE UN MEDECIN). CONSERVEZ CES INSTRUCTIONS. LISEZ LE MANUEL D'OPERATION OU LES INSTRUCTIONS AVANT D'INSTALLER, UTILISER OU ENTRETENIR CET EQUIPEMENT.

Les produits et procédés de soudage peuvent sauser des blessures graves ou la mort, de même que des dommages au reste du matériel et à la propriété, si l'utilisateur n'adhère pas strictement à toutes les règles de sécurité et ne prend pas les précautions nécessaires.

En soudage et coupage, des pratiques sécuritaires se sont développées suite à l'expérience passée. Ces pratiques doivent être apprises par étude ou entraînement avant d'utiliser l'equipement. Toute personne n'ayant pas suivi un entraînement intensif en soudage et coupage ne devrait pas tenter de souder. Certaines pratiques concernent les équipements raccordés aux lignes d'alimentation alors que d'autres s'adressent aux groupes électrogènes.

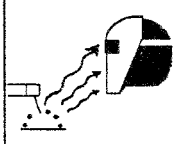
La norme Z49.1 de l'American National Standard, intitulée "SAFETY IN WELDING AND CUTTING" présente les pratiques sécuritaires à suivre. Ce document ainsi que d'autres guides que vous devriez connaître avant d'utiliser cet équipement sont présentés à la fin de ces instructions de sécurité.

SEULES DES PERSONNES QUALIFIEES DOIVENT FAIRE DES TRAVAUX D'INSTALLATION, DE REPARATION, D'ENTRETIEN ET D'ESSAI.

L'ELECTROCUTION PEUT ETRE MORTELLE.

Une décharge électrique peut tuer ou brûler gravement. L'électrode et le circuit de soudage sont sous tension dès la mise en circuit. Le circuit d'alimentation et les circuits internes de l'équipement sont aussi sous tension dès la mise en marche. En soudage automatique ou semi-automatique avec fil, ce dernier, le rouleau ou la bobine de fil, le logement des galets d'entrainement et toutes les pièces métalliques en contact avec le fil de soudage sont sous tension. Un équipement inadéquatement installé ou inadéquatement mis à la terre est dangereux.

1. Ne touchez pas à des pièces sous tension.
2. Portez des gants et des vêtements isolants, secs et non troués.
3. Isolez-vous de la pièce à souder et de la mise à la terre au moyen de tapis isolants ou autres.
4. Déconnectez la prise d'alimentation de l'équipement ou arrêtez le moteur avant de l'installer ou d'en faire l'entretien. Bloquez le commutateur en circuit ouvert ou enlevez les fusibles de l'alimentation afin d'éviter une mise en marche accidentelle.
5. Veuillez à installer cet équipement et à le mettre à la terre selon le manuel d'utilisation et les codes nationaux, provinciaux et locaux applicables.
6. Arrêtez tout équipement après usage. Coupez l'alimentation de l'équipement s'il est hors d'usage ou inutilisé.
7. N'utilisez que des porte-électrodes bien isolés. Ne jamais plonger les porte-électrodes dans l'eau pour les refroidir. Ne jamais les laisser traîner par terre ou sur les pièces à souder. Ne touchez pas aux porte-électrodes raccordés à deux sources de courant en même temps. Ne jamais toucher quelqu'un d'autre avec l'électrode ou le porte-électrode.
8. N'utilisez pas de câbles électriques usés, endommagés, mal épissés ou de section trop petite.
9. N'enroulez pas de câbles électriques autour de votre corps.
10. N'utilisez qu'une bonne prise de masse pour la mise à la terre de la pièce à souder.
11. Ne touchez pas à l'électrode lorsqu'en contact avec le circuit de soudage (terre).
12. N'utilisez que des équipements en bon état. Réparez ou remplacez aussitôt les pièces endommagées.
13. Dans des espaces confinés ou mouillés, n'utilisez pas de source de courant alternatif, à moins qu'il soit muni d'un réducteur de tension. Utilisez plutôt une source de courant continu.
14. Portez un harnais de sécurité si vous travaillez en hauteur.
15. Fermez solidement tous les panneaux et les capots.



LE RAYONNEMENT DE L'ARC PEUT BRÛLER LES YEUX ET LA PEAU; LE BRUIT PEUT ENDOMMAGER L'OUIE.

L'arc de soudage produit une chaleur et des rayons ultraviolets intenses, susceptibles de brûler les yeux et la peau. Le bruit causé par certains procédés peut endommager l'ouïe.

1. Portez une casque de soudeur avec filtre oculaire de nuance appropriée (consultez la norme ANSI Z49 indiquée ci-après) pour vous protéger le visage et les yeux lorsque vous soudez ou que vous observez l'exécution d'une soudure.
2. Portez des lunettes de sécurité approuvées. Des écrans latéraux sont recommandés.
3. Entourez l'aire de soudage de rideaux ou de cloisons pour protéger les autres des coups d'arc ou de l'éblouissement; avertissez les observateurs de ne pas regarder l'arc.
4. Portez des vêtements en matériaux ignifuges et durables (laine et cuir) et des chaussures de sécurité.
5. Portez un casque antibruit ou des bouchons d'oreille approuvés lorsque le niveau de bruit est élevé.

SELECTION DES NUANCES DE FILTRES OCULAIRES POUR LA PROTECTION DES YEUX EN COUPAGE ET SOUDAGE
(selon AWS A 8.2-73)

Opération de Coupage ou soudage	Dimension d'électrode ou Epaisseur de métal ou Intensité de courant	Nuance de de filtre oculaire
Brasage tendre au chalumeau	toutes conditions	2
Brasage fort au chalumeau	toutes conditions	3 ou 4
Oxycoupage		
mince	moins de 1 po. (25 mm)	2 ou 3
moyen	de 1 à 6 po. (25 à 150 mm)	4 ou 5
épais	plus de 6 po. (150 mm)	5 ou 6
Soudage aux gaz		
mince	moins de 1/8 po. (3 mm)	4 ou 5
moyen	de 1/8 à 1/2 po. (3 à 12 mm)	5 ou 6
épais	plus de 1/2 po. (12 mm)	6 ou 8
Soudage à l'arc avec	moins de 5/32 po. (4 mm)	10
electrode enrobées (SMAW)	de 5/32 à 1/4 po. (4 à 6.4 mm)	12
	plus de 1/4 po. (6.4 mm)	14
Soudage à l'arc sous gaz avec fil plein (GMAW)		
métaux non-ferreux	toutes conditions	11
métaux ferreux	toutes conditions	12
Soudage à l'arc sous gaz avec électrode de tungstène (GTAW)	toutes conditions	12
Soudage à l'hydrogène atomique (AHW)	toutes conditions	12
Soudage à l'arc avec électrode de carbone (CAW)	toutes conditions	12
Soudage à l'arc Plasma (PAW)	toutes dimensions	12
Gougeage Air-Arc avec électrode de carbone		
mince		12
épais		14
Coupage à l'arc Plasma (PAC)		
mince	moins de 300 ampères	9
moyen	de 300 à 400 ampères	12
épais	plus de 400 ampères	14

LES VAPEURS ET LES FUMEES SONT DANGEREUSES POUR LA SANTE.

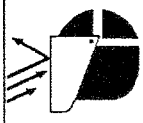
Le soudage dégage des vapeurs et des fumées dangereuses à respirer.

1. Eloignez la tête des fumées pour éviter de les respirer.
2. A l'intérieur, assurez-vous que l'aire de soudage est bien ventilée ou que les fumées et les vapeurs sont aspirées à l'arc.
3. Si la ventilation est inadequate, portez un respirateur à adduction d'air approuvé.
4. Lisez les fiches signalétiques et les consignes du fabricant relatives aux métaux, aux produits consummables, aux revêtements et aux produits nettoyants.
5. Ne travaillez dans un espace confiné que s'il est bien ventilé; sinon, portez un respirateur à adduction d'air. Les gaz protecteurs de soudage peuvent déplacer l'oxygène de l'air et ainsi causer des malaises ou la mort. Assurez-vous que l'air est propre à la respiration.
6. Ne soudez pas à proximité d'opérations de dégraissage, de nettoyage ou de pulvérisation. La chaleur et les rayons de l'arc peuvent réagir avec des vapeurs et former des gaz hautement toxiques et irritants.
7. Ne soudez des tôles galvanisées ou plaquées au plomb ou au cadmium que si les zones à souder ont été grattées à fond, que si l'espace est bien ventilé; si nécessaire portez un respirateur à adduction d'air. Car ces revêtements et tout métal qui contient ces éléments peuvent dégager des fumées toxiques au moment du soudage.

LE SOUDAGE PEUT CAUSER UN INCENDIE OU UNE EXPLOSION

L'arc produit des étincellies et des projections. Les particules volantes, le métal chaud, les projections de soudure et l'équipement surchauffé peuvent causer un incendie et des brûlures. Le contact accidentel de l'électrode ou du fil-électrode avec un objet métallique peut provoquer des étincelles, un échauffement ou un incendie.

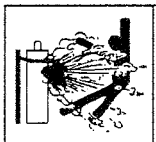
1. Protégez-vous, ainsi que les autres, contre les étincelles et du métal chaud.
2. Ne soudez pas dans un endroit où des particules volantes ou des projections peuvent atteindre des matériaux inflammables.
3. Enlevez toutes matières inflammables dans un rayon de 10, 7 mètres autour de l'arc, ou couvrez-les soigneusement avec des bâches approuvées.
4. Méfiez-vous des projections brulantes de soudage susceptibles de pénétrer dans des aires adjacentes par de petites ouvertures ou fissures.
5. Méfiez-vous des incendies et gardez un extincteur à portée de la main.
6. N'oubliez pas qu'une soudure réalisée sur un plafond, un plancher, une cloison ou une paroi peut enflammer l'autre côté.
7. Ne soudez pas un récipient fermé, tel un réservoir ou un baril.
8. Connectez le câble de soudage le plus près possible de la zone de soudage pour empêcher le courant de suivre un long parcours inconnu, et prévenir ainsi les risques d'électrocution et d'incendie.
9. Ne dégelez pas les tuyaux avec un source de courant.
10. Otez l'électrode du porte-électrode ou coupez le fil au tube-contact lorsqu'inutilisé après le soudage.
11. Portez des vêtements protecteurs non huileux, tels des gants en cuir, une chemise épaisse, un pantalon revers, des bottines de sécurité et un casque.



LES ETINCELLES ET LES PROJECTIONS BRULANTES PEUVENT CAUSER DES BLESSURES.

Le piquage et le meulage produisent des particules métalliques volantes. En refroidissant, la soudure peut projeter du éclats de laitier.

1. Portez un écran facial ou des lunettes protectrices approuvées. Des écrans latéraux sont recommandés.
2. Portez des vêtements appropriés pour protéger la peau.



LES BOUTEILLES ENDOMMAGEES PEUVENT EXPLOSER

Les bouteilles contiennent des gaz protecteurs sous haute pression. Des bouteilles endommagées peuvent exploser. Comme les bouteilles font normalement partie du procédé de soudage, traitez-les avec soin.

1. Protégez les bouteilles de gaz comprimé contre les sources de chaleur intense, les chocs et les arcs de soudage.
2. Enchainez verticalement les bouteilles à un support ou à un cadre fixe pour les empêcher de tomber ou d'être renversées.
3. Eloignez les bouteilles de tout circuit électrique ou de tout soudage.
4. Empêchez tout contact entre une bouteille et une électrode de soudage.
5. N'utilisez que des bouteilles de gaz protecteur, des détendeurs, des boyaux et des raccords conçus pour chaque application spécifique; ces équipements et les pièces connexes doivent être maintenus en bon état.
6. Ne placez pas le visage face à l'ouverture du robinet de la bouteille lors de son ouverture.
7. Laissez en place le chapeau de bouteille sauf si en utilisation ou lorsque raccordé pour utilisation.
8. Lisez et respectez les consignes relatives aux bouteilles de gaz comprimé et aux équipements connexes, ainsi que la publication P-1 de la CGA, identifiée dans la liste de documents ci-dessous.

MISE EN GARDE

LES MOTEURS PEUVENT ETRE DANGEREUX

LES GAZ D'ECHAPPEMENT DES MOTEURS PEUVENT ETRE MORTELS.

Les moteurs produisent des gaz d'échappement nocifs.

1. Utilisez l'équipement à l'extérieur dans des aires ouvertes et bien ventilées.
2. Si vous utilisez ces équipements dans un endroit confiné, les fumées d'échappement doivent être envoyées à l'extérieur, loin des prises d'air du bâtiment.

LE CARBURANT PEUR CAUSER UN INCENDIE OU UNE EXPLOSION.

Le carburant est hautement inflammable.

1. Arrêtez le moteur avant de vérifier le niveau de carburant ou de faire le plein.
2. Ne faites pas le plein en fumant ou proche d'une source d'étincelles ou d'une flamme nue.
3. Si c'est possible, laissez le moteur refroidir avant de faire le plein de carburant ou d'en vérifier le niveau au début du soudage.
4. Ne faites pas le plein de carburant à ras bord: prévoyez de l'espace pour son expansion.
5. Faites attention de ne pas renverser de carburant. Nettoyez tout carburant renversé avant de faire démarrer le moteur.

DES PIECES EN MOUVEMENT PEUVENT CAUSER DES BLESSURES.

Des pièces en mouvement, tels des ventilateurs, des rotors et des courroies peuvent couper doigts et mains, ou accrocher des vêtements amples.

1. Assurez-vous que les portes, les panneaux, les capots et les protecteurs soient bien fermés.
2. Avant d'installer ou de connecter un système, arrêtez le moteur.
3. Seules des personnes qualifiées doivent démonter des protecteurs ou des capots pour faire l'entretien ou le dépannage nécessaire.
4. Pour empêcher un démarrage accidentel pendant l'entretien, débranchez le câble d'accumulateur à la borne négative.
5. N'approchez pas les mains ou les cheveux de pièces en mouvement; elles peuvent aussi accrocher des vêtements amples et des outils.
6. Réinstallez les capots ou les protecteurs et fermez les portes après des travaux d'entretien et avant de faire démarrer le moteur.

DES ETINCELLES PEUVENT FAIRE EXPLOSER UN ACCUMULATEUR; L'ELECTROLYTE D'UN ACCUMULATEUR PEUT BRULER LA PEAU ET LES YEUX.

Les accumulateurs contiennent de l'électrolyte acide et dégagent des vapeurs explosives.

1. Portez toujours un écran facial en travaillant sur un accumulateur.
2. Arrêtez le moteur avant de connecter ou de déconnecter des câbles d'accumulateur.
3. N'utilisez que des outils anti-étincelles pour travailler sur un accumulateur.
4. N'utilisez pas une source de courant de soudage pour charger un accumulateur ou survolter momentanément un véhicule.
5. Utilisez la polarité correcte (+ et –) de l'accumulateur.

LA VAPEUR ET LE LIQUIDE DE REFROIDISSEMENT BRULANT SOUS PRESSION PEUVENT BRULER LA PEAU ET LES YEUX.

Le liquide de refroidissement d'un radiateur peut être brûlant et sous pression.

1. N'ôtez pas le bouchon de radiateur tant que le moteur n'est pas refroidi.
2. Mettez des gants et posez un torchon sur le bouchon pour l'ôter.
3. Laissez la pression s'échapper avant d'ôter complètement le bouchon.

PRINCIPALES NORMES DE SECURITE

Safety in Welding and Cutting, norme ANSI Z49.1, American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33128.

Safety and Health Standards, OSHA 29 CFR 1910, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, norme AWS F4.1, American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33128.

National Electrical Code, norme 70 NFPA, National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, document P-1, Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Code for Safety in Welding and Cutting, norme CSA W117.2 Association canadienne de normalisation, Standards Sales, 276 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

Safe Practices for Occupation and Educational Eye and Face Protection, norme ANSI Z87.1, American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting and Welding Processes, norme 51B NFPA, National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

DESCRIPTION OF EQUIPMENT

General

There are three basic units of the EXCEL-ARC®. The EXCEL-ARC® 500 (CC), Part Number 100002A-1, is a constant-current transformer-rectifier type DC welding machine that provides volt-ampere characteristic curves that are basically drooping with a slight slope.

The EXCEL-ARC® 6045 (CV), Part Number 100002A-2, is a constant-voltage transformer-rectifier type DC welding machine that provides volt-ampere characteristic curves that are basically flat.

The EXCEL-ARC® 6045 (CC/CV), Part Number 100002A-3, is a combination constant-current and constant-voltage transformer-rectifier type DC welding machine that provides volt-ampere characteristic curves for each mode of operation.

Table 3-1 gives input voltage and amperage data for all part numbers covered by this manual.

Recommended Unit Applications

1. Gas metal arc welding (MIG)
2. Flux cored arc welding (with or without gas shielding)
3. Submerged arc welding
4. Electro-slag welding
5. Carbon arc gouging
6. SMAW (Stick welding)
7. GTAW (TIG welding)

Wire Feeder Compatibility

Some models of wire feeders will connect onto this unit with no special preparation. In some cases, however, an interface must be used and in other instances, some rewiring must be accomplished. Complete details for these exceptions will be found in the instruction manual supplied with the wire feeder.

ITEM	PART NO. 100002A-1 EXCEL-ARC® CC	PART NO. 100002A-2 EXCEL-ARC® CV	PART NO. 100002A-3 EXCEL-ARC® CC/CV	
			CC	CV
Rated Output Amperage	500 Amps	450 Amps	500 Amps	450 Amps
Rated Output Voltage	40 Volts	38 Volts	40 Volts	38 Volts
Rated Duty Cycle	40% Duty	100% Duty	60% Duty	100% Duty
Minimum Output	50 Amps	50 Amps @ 13 Volts	50 Amps	50 Amps @ 13 Volts
Maximum Output	500 Amps	450 Amps @ 38 Volts	500 Amps	450 Amps @ 40 Volts
Rated Input Voltage	230/400	230/400	230/400	230/400
Rated Input Amperage	83/47	77/44	83/47	77/44
Input kW	27.2 kW	21.8 kW	27.2 kW	21.8 kW
Input kVA	32.8 kVA	30.7 kVA	32.8 kVA	30.7 kVA
Input Frequency	50/60 Hz	50/60 Hz		50/60 Hz
Input Phase	3 Phase	3 Phase		3 Phase
Maximum Open Circuit Voltage	61	61	61	
Auxiliary Power	1 kVA – 115V, 9 A	1 kVA – 115V, 9 A	1 kVA – 115V, 9 A	
No Load Input Voltage	230/400	230/400	230/400	
No Load Input Amperage	3.0/1.8	4.3/3.0	3.0/1.8	
No Load kW	.9 kW	1.1 kW	.9 kW	
No Load kVA	1.94 kVA	2.4 kVA	2.4 kVA	
Power Factor	.80	.85	.80	
Efficiency	73%	78%		

Table 3-1 Input Voltage/Amperage Data

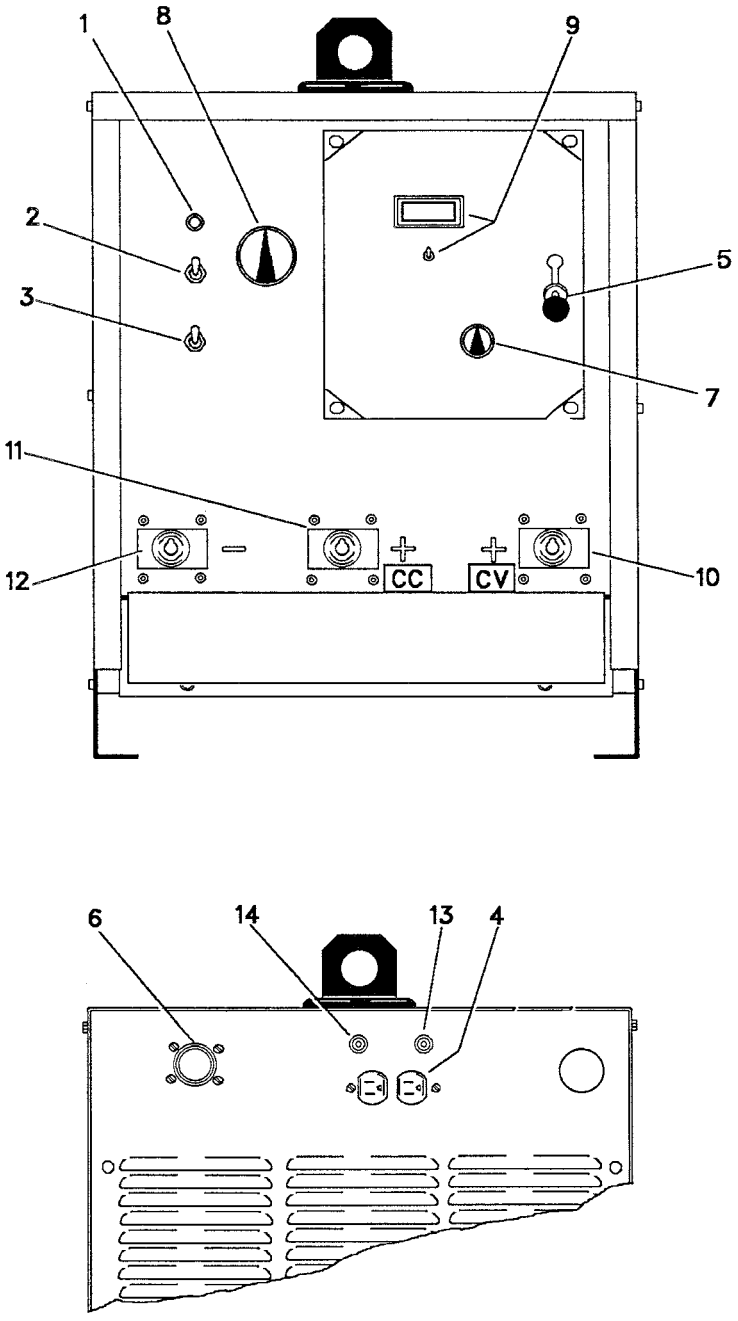


Figure 3-1 Front and Rear Panel

Controls and Outlets

See callouts on Figure 3-1.

1. Overload Indicator — Yellow L.E.D., when lighted,indicates that machine has shut down as a result of amperage overload or rectifier overtemperature (S2).

2. Input Contactor Control (100002A-1, -2, -3) — This toggle switch is the master power switch for the welding machine, and must be in the ON position before any other section will operate. The primary circuit of the control transformer is energized whenever line voltage is present at the input terminals. This switch closes the secondary circuit of the control transformer, energizing the contactor, which energizes the power transformer. Do not use this switch to start or stop arc. Start arc with switch ON, break arc, then turn switch OFF.

3. Local/Remote Output Control Volts/Amps Selector Switch (100002A-1, -2, -3) — Selects either the output control (Local) or some remote control device (Remote) to control welding output.

4. 115-V AC Receptacles (100002A-1, -2, -3) — Provides auxiliary power for lights, wire feeders, water pumps, etc. — 10 amps maximum.

5. CC/CV Selector Switch (CC/CV) (100002A-3) — Selects the welding mode of operation.

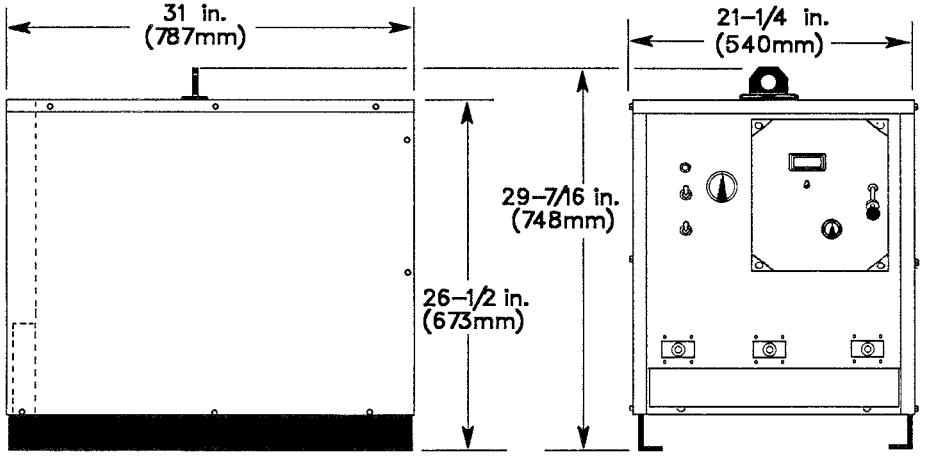
6. Feeder Control Receptacle Panel (Automatic) (CV units) (100002A-2, -3) — Amphenol (19-pin) connector for a remote voltage control type wire feeder.

7. Arc Force Control (CC/CV Units) (100002A-1, -3) — This potentiometer controls short circuit (welding) current to produce an increase in current as the arc length is shortened. The control is present to provide the degree of "hard start" required, and the additional dynamic change for welding tight grooves, etc. Turn clockwise to increase "hard start" characteristics, counterclockwise to obtain a soft-start, smooth arc.

8. Welding Voltage/Amperes Control (CV Units) (100002A-2, -3) — Adjusts arc welding output and open circuit voltage. Open-circuit voltage is approximately 1.5 times the welding voltage for constant voltage welding. On 100002A-1, -3 (CC units) — Adjusts the welding current.

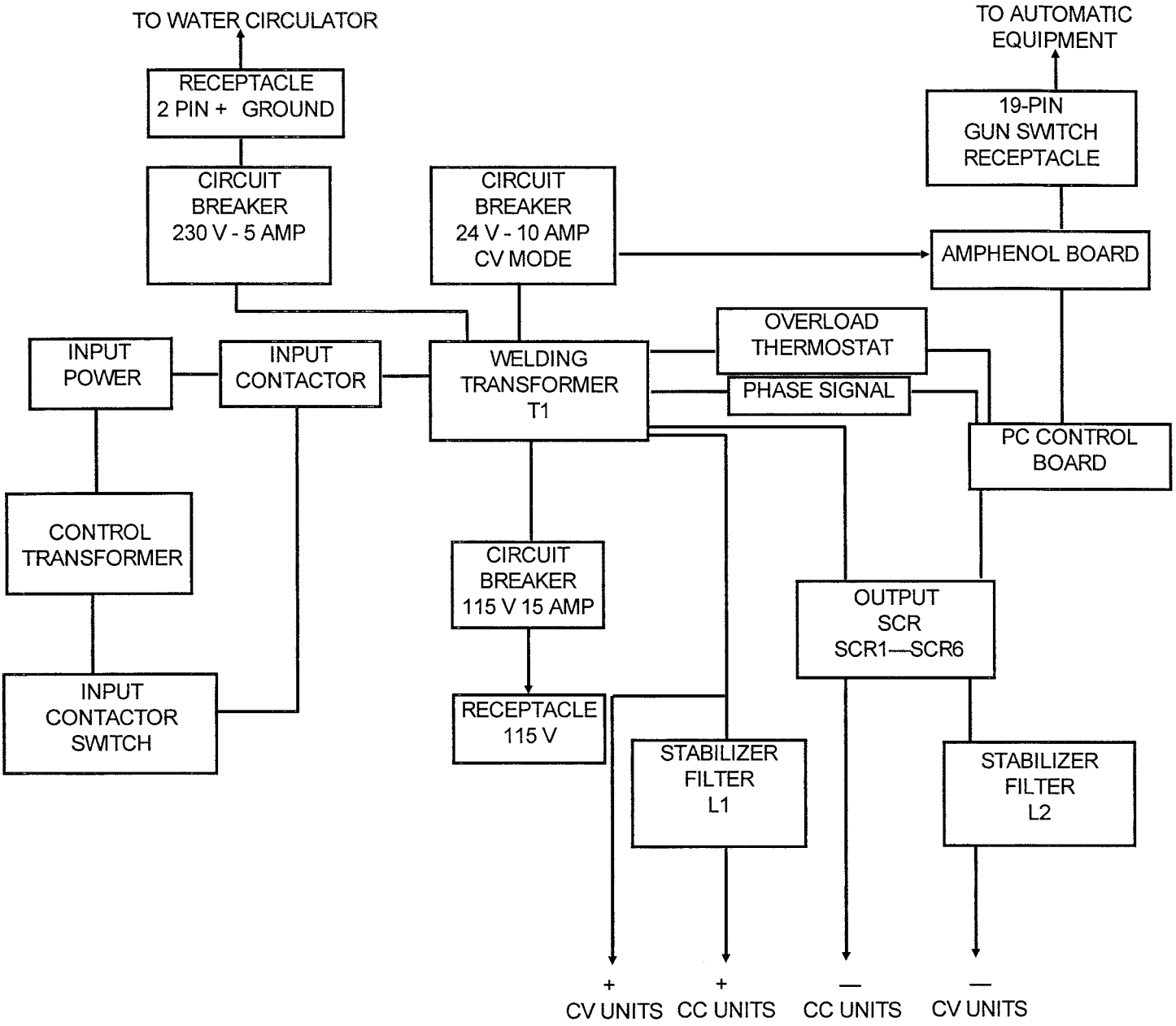
9. Volt/Amp Meter and Switch (CV Units) (100002A-2, -3) — A single meter with switch that will read DC volts when in the V. position or read DC amps in the A. position.

10. Positive Terminal (+) (CV mode) (100002A-2, -3) — Serves as a connection point for the lead to the wire feeder when reverse polarity is desired.



Weight (CC/CV) – 510 lb (231 kg)
(CC) – 460 lb (209 kg)
(CV) – 455 lb (206 kg)

Figure 3-2 EXCEL-ARC® 500 and 6045 Dimensions and Weight



Functional Block Diagram for EXCEL-ARC® 500 and 6045

11. Positive Terminal (+) (CC mode) (100002A-1, -3) — Serves as a connection point for the lead to the electrode holder lead for SMAW (stick) or arc gouging mode of operation when reverse polarity is desired.

NOTE: To obtain opposite welding polarity, simply reverse the connections to the positive and negative terminals.

12. Negative Terminal (—) — Serves as a connection point for the lead to the workpiece when reverse polarity is desired.

13. Circuit Breaker — Rated at 10 amps — provides protection to the 115-volt circuit which includes the fan and the 115-volt AC power receptacle.

14. Circuit Breaker — Rated at 10 amps — provides protection to the 24-volt circuit for the wire feeder and automatic equipment.

Duty Cycle

(Figure 3-3)

Duty cycle is the percentage of each ten-minute period of time that the welding machine may be operated under rated load conditions. For example, a duty cycle of 60% means that the machine can be operated at rated load for an average of 6 minutes of each 10 minute period of operation. During the remaining 4 minutes, the machine must idle to permit proper cooling. Figure 3-3 enables the operator to determine the duty cycle at various welding amperages.

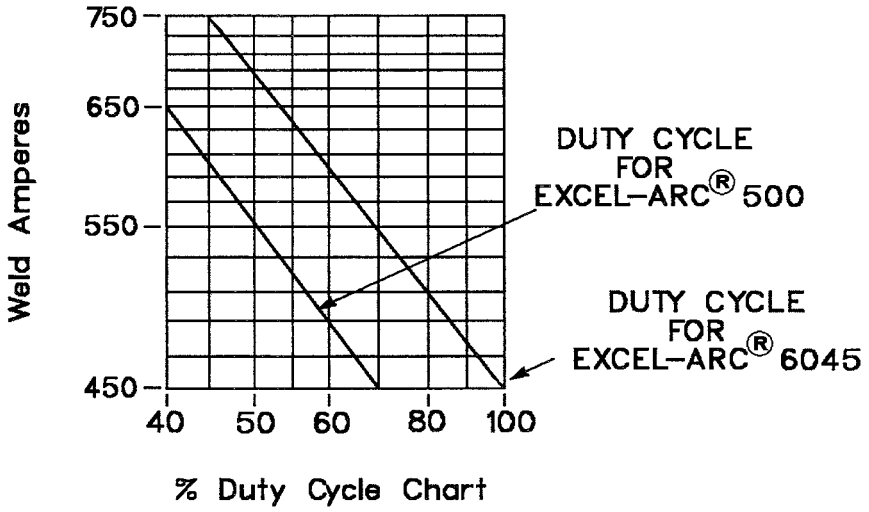
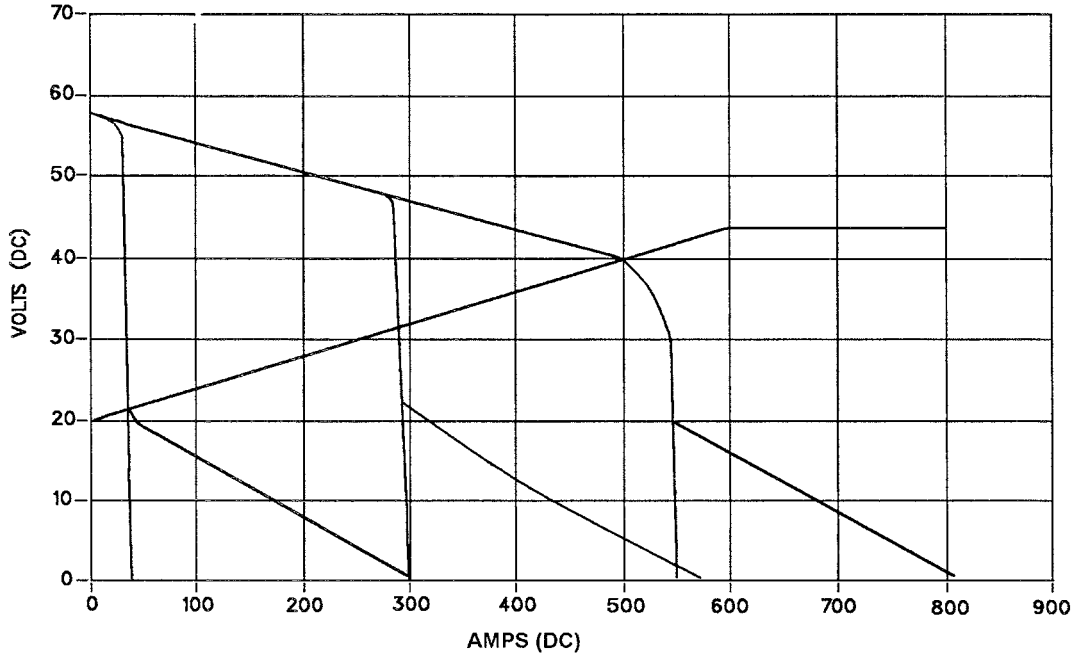


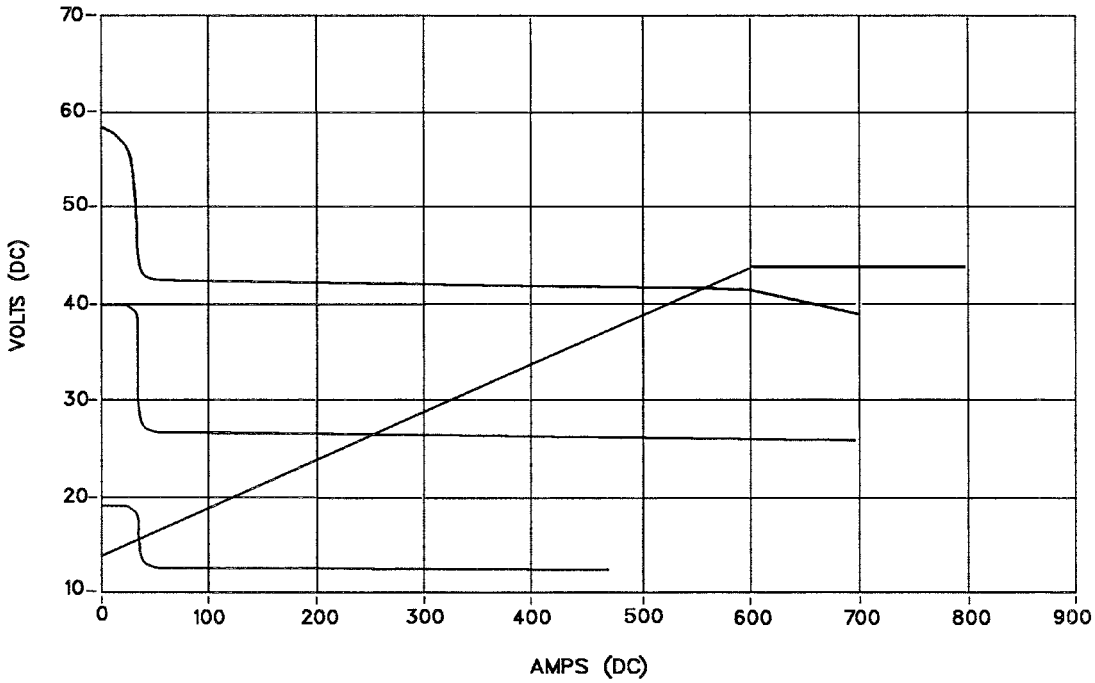
Figure 3-3 Duty Cycle Chart

EXCEL-ARC® 500 AND 6045
CC/CV VOLT-AMP CURVES

EXCEL-ARC® (CC) MODE



EXCEL-ARC® (CV) MODE



INSTALLATION

Location

For best operating characteristics and longest unit life, take care in selecting an installation site. Avoid locations exposed to high humidity, dust, high ambient temperature, or corrosive fumes. Moisture can condense on electrical components, causing corrosion or shorting of circuits. Dirt on components helps retain this moisture.

Adequate air circulation is needed at all times in order to assure proper operation. Provide a minimum of 12 inches (305 mm) of free air space at both front and rear of the unit. Make sure that the ventilator openings are not obstructed.

Grounding

The frame of this welding machine should be grounded for personnel safety, and to assure operation of the overcurrent protection. The grounding method, and the equipment grounding conductor size and type shall conform to local and national codes.

For the National Electrical Code, the equipment grounding conductor shall be green, green with a yellow stripe, or bare.

If flexible power cable is used, use a cable assembly which includes the equipment grounding conductor. If metallic armored cable or conduit is used, the metal sheathing or conduit must be effectively grounded per local and national codes.

Rubber-tire mounted equipment shall be grounded to conform to local and national codes. The grounding assists in providing protection against line voltage electrical shock and static shock. The grounding serves to discharge the static electric charge which tends to build up on rubber-tire mounted equipment. This static charge can cause

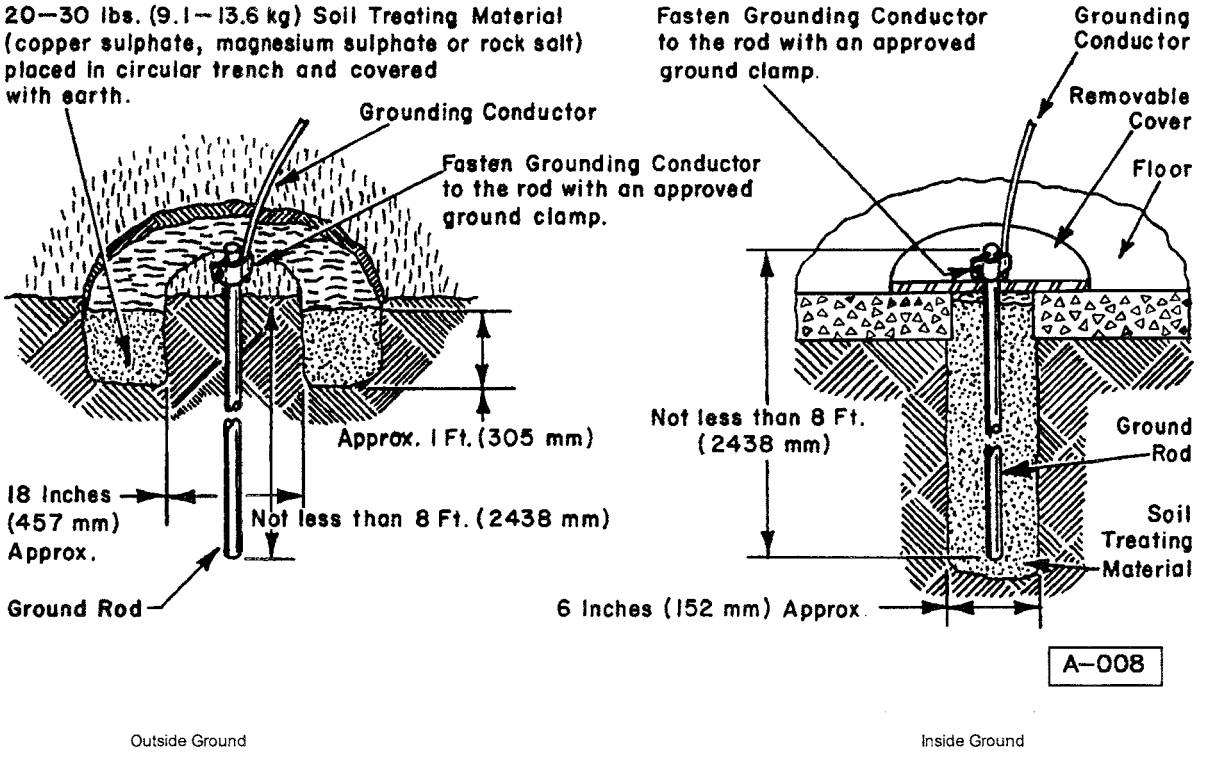

20—30 lbs. (9.1—13.6 kg) Soil Treating Material (copper sulphate, magnesium sulphate or rock salt) placed in circular trench and covered with earth.
Grounding Conductor
Fasten Grounding Conductor to the rod with an approved ground clamp.
Approx. 1 Ft. (305 mm)
18 Inches (457 mm) Approx.
Not less than 8 Ft. (2438 mm)
Ground Rod
Outside Ground
Fasten Grounding Conductor to the rod with an approved ground clamp.
Grounding Conductor
Removable Cover
Floor
Not less than 8 Ft. (2438 mm)
Ground Rod
Soil Treating Material
6 Inches (152 mm) Approx.
A-008
Inside Ground

Figure 4-1

LINE VOLTS	RATED LOAD AMPS	APPROX. LINE FUSE SIZE	COPPER LINE WIRE SIZE*		COPPER GROUNDING CONDUCTOR MIN. SIZE
			IN CONDUIT	FLEXIBLE CABLE	
230	79	100	No. 6	No. 6	No. 8
400	45	60	No. 8	No. 6	No. 10

**Conductor size shall be modified as required for line voltage drop and ambient temperature. Sizes listed for conduit installation are based on 90° C conductor insulation, designated as FEP, FEPB, RHH, and THHN.*

Table 4-1 Recommended Wire and Fuse Size Table

painful shock and lead to the erroneous conclusion that an electrical fault exists in the equipment.

If a system ground is not available, consult the electrical code enforcement body for instructions. The welding machine should be connected to an adequate driven ground rod, or to a water pipe that enters the ground not more than 10 feet (30 meters) from the machine.

The equipment grounding conductor size is listed in Table 4-1 as a guide, if no local or national code is applicable.

Attach the equipment grounding conductor to the stud provided on the yoke. Determine that the ground wire size is adequate before the machine is operated.

CAUTION: Be sure to replace the cabinet top to assure adequate internal ventilation and prevent component failure.

Internal Wiring Check

Refer to the product identification plate (nameplate) on the welding machine's rear panel to determine the power input voltages and frequency at which it will be operated.

Remove left side panel for access to Line Voltage Changeover circuitry. Check line voltage connections against instructions on Voltage Changeover Diagram supplied with this manual. If necessary, rearrange internal wiring and/or link connections.

Connecting Welding Machine to Line Voltage

The input power should be connected to the unit through a fused disconnect switch, or other suitable disconnecting means furnished by the user. A hole is provided in the rear panel of the machine, near to the input connections, for the entry of the input conductors.

DANGER: ELECTRIC SHOCK CAN KILL. Open the disconnect switch, or breaker, and determine that no voltage is present, before connecting wires between welding machine and power supply.

CAUTION: The method of installation, conductor size, and overcurrent protection shall conform to the requirements of the local electrical code, the National Electrical Code, or other national codes, as applicable. All installation wiring and machine reconnections shall be done by qualified persons.

Table 4-1 provides minimal information for selection of line conductors, fuses, and the equipment grounding conductor. This information is from the National Electrical Code NFPA 70-1981 Edition. Install this equipment per the latest edition, available

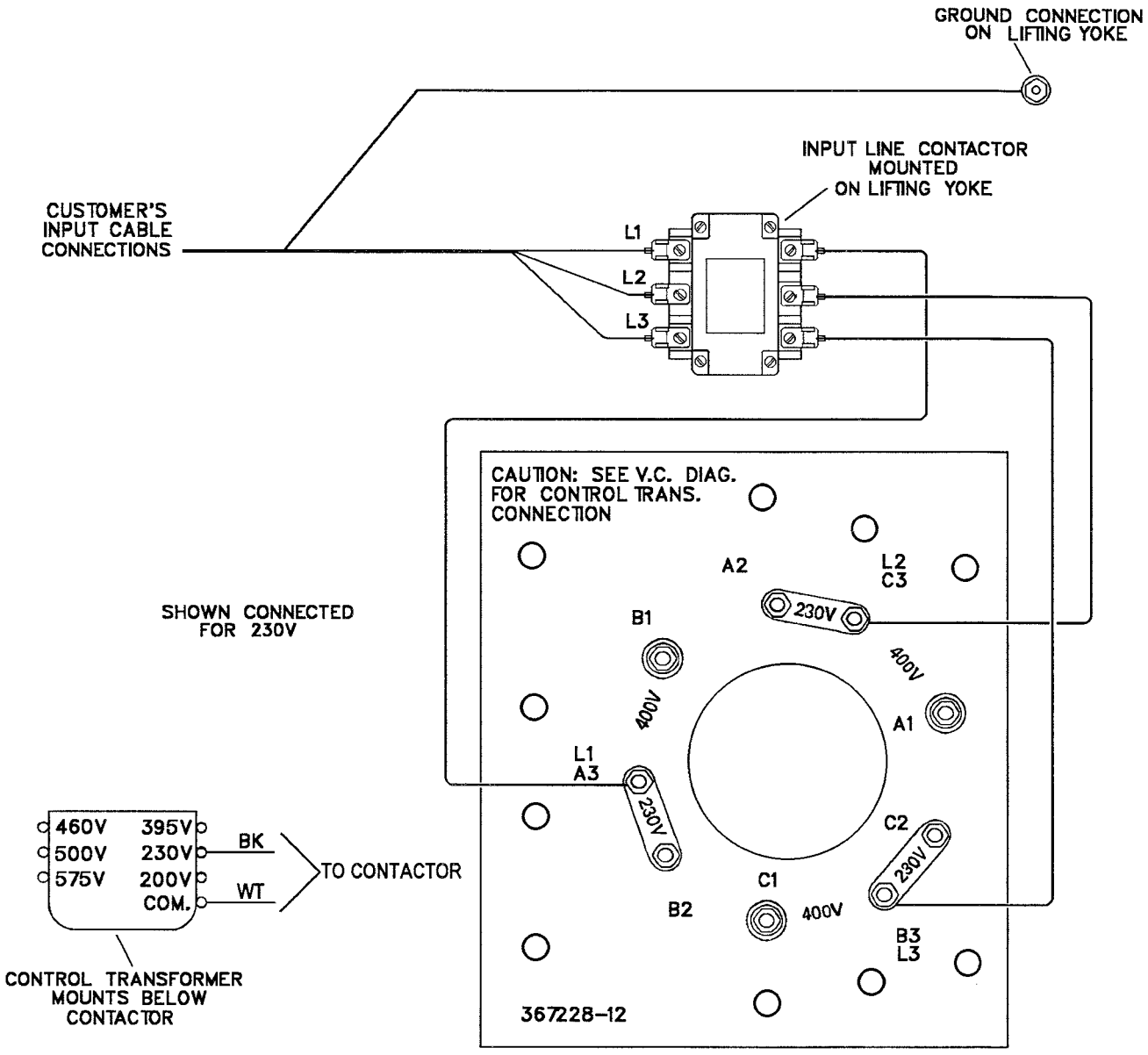


Figure 4-2 Input Voltage Connection & Changeover

from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

Connect the three-phase line leads to terminals L1, L2, and L3 on the line contactor inside the welding machine cabinet.

Welding Leads

Use Table 4-2 for selection of the proper size copper welding leads.

Welding Current Amperes	TOTAL LENGTH OF LEAD CIRCUIT IN FEET (AND METERS) (ELECTRODE LEAD PLUS WORK LEAD)				
	50 Feet (15.2 M)	100 Feet (30.5 M)	150 Feet (45.7 M)	200 Feet (61.0 M)	250 Feet (76.2 M)
100	#4	#4	#4	#3	#2
150	#3	#3	#2	#1	#1/0
200	#2	#2	#1	#1/0	#2/0
250	#1	#1	#1/0	#2/0	#3/0
300	#1/0	#1/0	#2/0	#3/0	#4/0
350	#1/0	#1/0	#3/0	#4/0	#4/0
400	#2/0	#2/0	#3/0	#4/0	2 — #2/0
450	#2/0	#2/0	#4/0	2 — #2/0	2 — #3/0
500	#3/0	#3/0	#4/0	2 — #2/0	2 — #3/0

For 60% duty cycle

NOTE: Lead size shown is for 90°C cable insulation, 30°C (86°F) ambient, and not over 4.5 volts lead drop.

Table 4-2

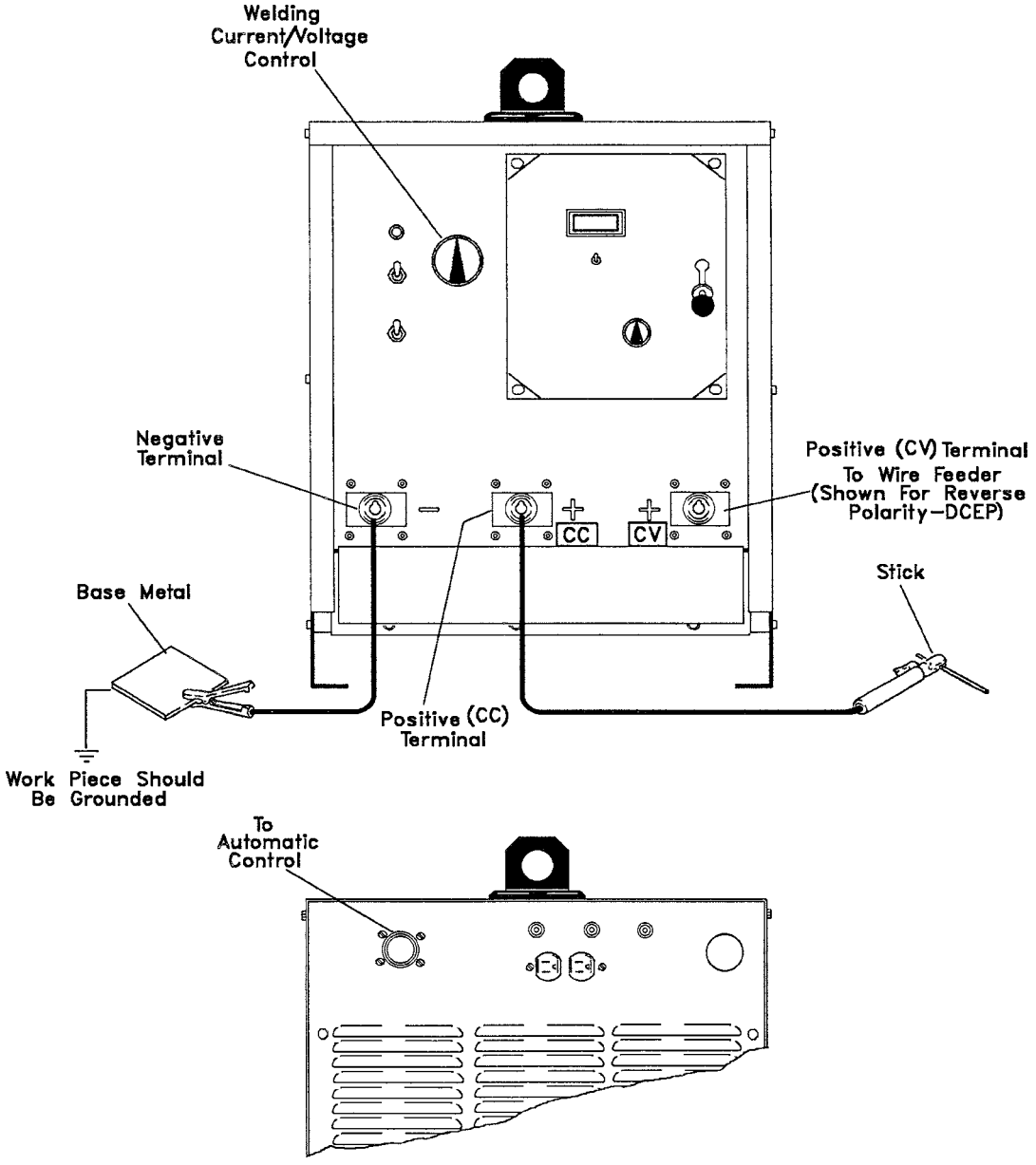


Figure 4-3 Installation Diagram

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OPERATION

General

Before operating this system, be sure that all installation instructions have been accomplished. When operating this system, observe all applicable Safety Warnings listed in this and related system manuals.

The operating instructions in this manual pertain only to the EXCEL-ARC® 500 and 6045 welding machines. Consult operating instructions for components used with this system before operating.

A thermostatically controlled fan motor is standard on this unit. The fan motor starts and stops automatically when a predetermined temperature has been reached.

Preweld Operation

1. Connect welding leads to terminals on front panel.

WARNING: Disconnect line voltage from the unit before making any connections inside unit. Turn off fused disconnect switch that supplies power to welding machine, and remove its fuse.

ELECTRIC SHOCK can kill!
- **Do not touch live electrical parts, including the output terminals and electrode.**

2. If used, connect remote control wire assembly and gun switch to welding machine. Connect feeder receptacle to wire electrode feeder system.

3. Refer to other manuals for component connections.

4. Set Output Control to desired value.

5. Set the remote/local control switch in the desired mode.

6. Place the voltage sensing jumpers (100002A-2, -3) on the main P.C. control board to the desired mode. Local (voltage sensing from the power source which comes from the factory), Jumper JP-2 (–) and JP-4 (+). For remote voltage sensing, going out to the optional terminal strip – Thermal Arc P/N 204248, Jumper JP-3 (–) and JP-5 (+).

SMAW (Stick) Welding, Carbon Arc Gouging

(100002A-1, 3)

Refer to Figure 3-1 for controls (numbers in parenthesis refer to callouts on Figure 3-1).

1. On 100002A-3 set the CC/CV selector switch to CC position.

2. Hold electrode clear of work. Be sure the Remote-Local Switch (3) is set to LOCAL position.

3. Turn Input Contactor Control Switch (2) to ON position.

4. Strike arc. Adjust Welding Output Control (8) if required. Adjust Arc Force Control (7) to desired level.

5. At the conclusion of welding, break arc, and turn Input Contactor Control Switch (2) to OFF position.

Welding, Semiautomatic or Automatic

Refer to Figure 3-1 for controls.

1. On 100002A-2, -3 set Remote/Local Output Control Switch (3) and Voltage Sensing Jumpers to LOCAL — JP-2 and JP-4.

NOTE: Set Output Control Switch (3) to REMOTE when using a feeder which controls the voltage, and remote voltage control is desired. Set Voltage Sensing Jumpers to JP-3 and JP-5 to REMOTE when using a feeder which provides voltage sensing at the actual welding location. If the Voltage Sensing Jumpers are placed in the REMOTE position, and the voltage sensing leads are not connected at the welding location, the output of the welding machine will go to maximum amperage.

2. On 100002A-3 set the CC/CV Selector Switch to CV position.

3. Place Input Contactor Control Switch (2) in ON position (Power ON).

4. Inch wire electrode to position over work; see related owner's manuals.

5. Depress gun switch trigger and strike arc.6. The Excel-Arc® weld termination sequence is fully adjustable. Three simple jumper changes on the main circuit board allow the following weld termination treatments.

A.) Burnback Delay (JP-1)
B.) "Wire Sharpening"™ (JP-9)
C.) Inhibit (JP-1)

A. Burnback Delay — The burnback setting calls the Excel-Arc® to maintain a contactor closure for .25 seconds after the gun trigger has been released and wire feeding has stopped. The features primary function is the prevention of wire sticking to the weld puddle upon completion of a weld. Another term commonly used to describe burnback is the term anti-stick.

The burnback option is preferred in the following situations.

– When Excel-Arc® is used with older wire feeders which do not have dynamic braking and would show a tendency to wire coasting.

– When Excel-Arc® is used on high cycle short weld applications or if a great deal of tack welding is done.

B. "Wire Sharpening"™ — Serves the same function as burnback. However in addition to maintaining contactor closure for .25 seconds, Excel-Arc® also lowers weld voltage to a value too low to maintain an arc but sufficient enough to burn off the remaining wire. The effect of this a significant reduction in the ball size of the end of the wire.

CAUTION: In order for this circuit to work properly, the MIG torch must remain stationary for the complete wire sharpening cycle.

"Wire Sharpening"™ is preferred in the following situations.

– Automatic welding operations, Robotic applications.

C. Inhibit — The inhibit selection disables both the wire sharpening circuit and the burnback circuit. This feature may be useful in situations where an external control is used to control power source functions with the burnback circuit mentioned earlier.

This unit is equipped with an overload indicator - yellow L.E.D. When lighted, indicates that the machine has shutdown as a result of amperage overload or overtemperature.

To reset the overload indicator, release the gun trigger switch. If the indicator light goes out, the indication was due to amperage overload. If the light does not go out, the indication was due to an overtemperature condition. The unit will not weld until the overtemperature condition has dissipated and the light goes out. If the light comes on repeatedly or often, then investigate for the cause of overload or overtemperature and take steps to correct the causes.

Some causes of overload are:

1) Gun contact tip shorted to workpiece.
2) Diameter of filler wire too large for machine rating can cause overload to trip on weld starts.

Some causes of overtemperature are:

1) Exceeding current rating and/or duty cycle rating of machine.
2) Blocked or restricted air inlets or outlets to machine.

MAINTENANCE

Replacing SCRs

Replacing a SCR is a critical task but it can be accomplished in the field by following the instructions in the Detailed Troubleshooting section of the Troubleshooting chapter of this manual.

Lubrication

The fan motor incorporates a sleeve bearing and therefore will need periodic lubrication. The following table will furnish a recommended guide to the frequency of this lubrication.

Type of Duty	Lubrication Interval
Light (up to 6 hrs./day)	Every 12 months
Moderate (7 to 15 hrs./day)	Every 6 months
Heavy (16 to 24 hrs./day)	Every 3 months

NOTE: Apply 1-12 drops of 20W non-detergent oil at each end of bearing.

Inspection and Cleaning

For uninterrupted, satisfactory service from this welding machine, it is necessary to keep the machine clean, dry, and well ventilated. At least every three months, or more often as necessary, wipe and blow out all dirt from the machine's internal components, with air pressure of not over 25 psi (172 kPa). Be sure to wipe the fan blades clean.

Check and tighten all electrical connections as necessary to eliminate unnecessary losses and to avoid subsequent trouble from overheating or open circuits. Check for broken wiring or damaged insulation on wiring.

CAUTION: The flow of air through the welding machine is carefully directed by baffles. Never operate the welding machine with any of the side or top panels removed or open, as serious damage to the rectifiers might result.

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TROUBLESHOOTING

General

(Also refer to Troubleshooting in wire feeder and gun manuals.)

Troubleshooting Guide

Welding machine will not start.

Power switch OFF

Place power switch in ON position.

Power lines dead

Check voltage.

Broken power lead

Repair.

Wrong line voltage

Check power supply.

Incorrect input power connections at welding machine

Check connections against wiring diagram.

Open circuit to power switch or control transformer

Repair. Check for broken wire or loose connections at terminals.

Fuse on control transformer blown

Remedy cause. Replace fuse.

Line contactor fails to close.

Defective NVR coil

Replace.

Mechanical obstruction on contactor

Remove.

Broken leads at line contactor

Repair.

Contactor chatters.

Line leads too small

Use larger leads.

Low line voltage

Check line voltage.

Contactor operates and blows link fuses.

Wrong line voltage

Check nameplate of welding machine for line voltage to use; check line voltage.

Links on voltage changeover board incorrectly connected

Check Voltage Changeover diagrams for link positions; connect links correctly. See Diagrams chapter.

Line fuse too small

Install proper size fuse.

SCR failure or shorted flyback diode

Refer to Detailed Troubleshooting Instructions.

Short circuit in primary connections

Remove short circuit.

Transformer failed

Repair or replace.

Unit delivers welding current but soon shuts down (Thermal overload trips)

Welding machine overloaded

Reduce load, overload can be carried only for a short time.

Duty cycle too high

Do not operate continually at overload currents.

Power leads too long or too small in cross section

Replace with larger diameter cable.

Ambient temperature too high

Operate at reduced loads when temperature exceeds 104° F (40° C).

Ventilation blocked

Check air intake and exhaust openings to be unobstructed.

Fan not operating after machine is loaded down

Check fan thermostat. Check bearings, disconnect leads and apply motor nameplate voltage to test.

Solid-state contactor operates, but welding machine will not deliver welding current, and open circuit voltage is present at the output when gun switch is depressed.

No ground connections at work

Make connections.

Welding cables not connected

Make connections.

Voltage/amps dial does not control welding voltage.

Potentiometer burned out

Replace.

Loose connections in voltage control circuit

Check connections.

Control circuit board failure

Replace control board.

Fan not operating (also see causes and remedies under "Welding machine will not start")

NOTE: Fan will not operate until rectifier heats up.

Motor failed

Replace or repair.

Broken lead or connection to fan motor

Repair wiring.

Blown circuit breaker on rear panel of welding machine

Reset circuit breaker. 115-volt receptacle may be overloaded.

Operator gets shock when welding machine case, ground cable, work, or work table is touched.

Case of welding machine not grounded

Ground welding machine case.

Work table and work not grounded

Ground work and work table to plant ground.

Abnormal current fluctuation, voltage nearly constant

Irregular wire feed speed

See welding head manual.

Inadequate shielding of arc by flux or gas

Increase shielding by trial and error. See welding head manual.

Wire feed rate too slow

Increase wire feed. See wire burn-off rate charts.

Too much shielding gas

Decrease by trial and error. See welding head manual.

Loose cable connections

Check for overheated connections and tighten.

Welding contact tube (tip) on wire feeder makes poor contact with electrode

Check contact tube hole size and replace with proper tube.

Contactor fails to open.

Contactor contacts sticking

Clean contacts.

Very noticeable, rough, sputtering arc. Loss of control and burnback. Minor starting problems.

Control circuit board failure

Replace Control P.C. Board.

Output of welding machines goes to maximum and there is no control.

Voltage sensing lead not connected

Connect lead.

Jumper JP-2 and JP-4 on Control P.C. Board not connected

Add jumpers JP-2 and JP-4 on Control P.C. Board.

Detailed Troubleshooting Instructions

The EXCEL-ARC® 500 AND 6045 are solid-state welding machines. The method of troubleshooting is different, but is not more difficult than troubleshooting a conventional unit. Do not overlook the obvious. As in the case of all electrical equipment, loose connections are the primary cause of malfunction both internal and external to the welding machine. Do not overlook bad grounds, worn contact tubes (tips), dirty cable liners, shorted control cables, wrong settings, blown fuses, worn contactors, misconnections from feeding equipment, misapplication, etc. To check the Control P.C. Board, take control module panel off the front panel. Check the control board for loose connectors, broken or loose wires. Inspect the P.C. Board for broken components, scorched or burned components. The only equipment needed to properly detect a problem on this welding machine is a simple voltohmmeter, although an oscilloscope is the best method to quickly "see" the problem.

Voltages of Interest — Refer to Connection Diagram.

1. Across the secondary on all three phases — 88.0 V AC ± 10%.

2. From the center bus bar on secondaries to the top or bottom of the secondary — 44.0 V AC ± 10%.

NOTE: The ± 10% refers to the possibility of having a high or low input line voltage.

3. 115 V Receptacles — 115 V AC ± 10%.

4. AC Input Voltage — Test Points R206 to R207 – 36 V AC voltage reading – AC voltage input to P.C Board; Test Points R208 to R209 – 36 V AC voltage reading – AC voltage input to P.C. Board; Test Points R210 to R211 – 36 V AC voltage reading – AC voltage input to P.C. Board.

5. Power Supply Checks — Test Points TP16 to TP18 – + 22 V DC meter reading – power supply reading; Test Points TP16 to TP17 – + 15 V DC meter reading – power supply reading; Test Points TP16 to TP19 – –15V DC meter reading – power supply reading.

6. Output Contactor Checks — Test Point TP16 to Anode L9 – + 16 V DC meter reading (for CC Mode); Test Point TP16 to L8 – + 16V DC meter reading (for CV Mode) – output switch to local pins A and B on Amphenol shorted together; Test Point TP16 to R22 – + 16V DC meter reading (for Tig position).

7. Output Reference Circuits — Test Point TP16 to TP9 – + 10 V DC meter reading – reference voltage supply; Test Point TP16 to L10 – –9.50 meter reading — Voltage reference supply to output pots.

8. SCR Firing Circuits — Test Point TP16 to TPE – 4.3 V DC meter reading – Checks ramp circuits; Test Point TP16 to TPD – 4.3 V DC meter reading – All readings should be very close for balance; Test Point TP16 to TPB – 4.3 V DC meter reading – All readings should be very close for balance; Test Point TP16 to + C69 – 17-19 V DC meter reading – Checks SCR Gate; Test Point TP16 to + C70 – 17-19 V DC meter reading – Generator Circuits; Test Point TP16 to + C71 – 17-19 V DC meter reading – All should be equal.

Control Circuit Board Malfunction — If a board malfunction occurs, the following situations will probably result:

1. Loss of arc completely.

2. Very noticeable, rough, sputtering arc.

3. Loss of control and burnback.

4. Minor starting problems.

SCR Malfunction — If one or more SCRs malfunction, the following situations will probably result:

1. Blown line fuses as the result of a shorted SCR (similar to a shorted diode). A shorted flyback diode will also produce this situation.

2. If one SCR does not turn on [either it is open or the gate signal is not being received by the SCR (gate circuit open)], a very small change will occur at the arc and will be difficult to notice by the average operator. Generally when this happens, it will be necessary to adjust the voltage control on the front of the welding machine (turn it up) to obtain the same arc that was being produced before the defect occurred.

3. If two SCRs do not turn on, the arc becomes more erratic and unstable.

Component Testing

1. In the case of a severe malfunction, such as a shorted SCR or diode, do not turn on the unit. Disconnect the leads from the transformer to the heat sink assembly and check with a VOM for shorted SCRs or a shorted flyback diode.

2. If the welding machine is suspected, a very simple test can tell you a great deal about it. Simulate gun switch closing and observe the open circuit voltage. This can be done by putting the Process Selection Switch (Fig. 3-1, item 5) in the CV position and shorting terminals A and B together on the 5-pin connector on the rear panel. This voltage should vary from 19V DC to 57V DC ± 10%, as the voltage

control is rotated from min. to max. slowly. If this voltage varies smoothly, there is a strong possibility that nothing has malfunctioned in the welding machine. If the voltage varies erratically and does not come close to the values listed, you probably have a control circuit board problem. If the voltage variation is somewhat smooth, but does not reach the maximum value (remember the ± 10% refers to a high or low line voltage), you probably have an SCR problem.

3. The next step is to go inside the unit and check the control circuit board. See the instructions provided for this test. It is important to run through the tests in the order they are listed. If an interface box is being used, it will be necessary to switch the welding machine local-remote switch to the local position.

4. If nothing is found defective on the board, the next step is to go to the SCRs. First of all an open gate or an open SCR *cannot* be checked with a VOM. If an SCR is not firing, the open circuit voltage (OCV) will shift down. Check the following table for typical values:

Disconnect cable # 103 from the capacitor bank assembly. Insulate the lug end of cable # 103 to prevent it from touching chassis or any other surface.

a. All SCRs firing properly — max. OCV = 57V DC.

b. 1 SCR not firing — max. OCV = 51V DC.

c. 2 SCRs not firing — max. OCV = 45V DC.

d. 3 SCRs not firing — max. OCV = 39V DC.

NOTE: These voltages were recorded at nominal line voltage with voltage control adjustment at MAXIMUM setting (unit adjusted for high open-circuit voltage).

The best way to isolate the particular SCR which is malfunctioning is as follows. Refer to Connection Diagram while inspecting the unit. On the output rectifier there are gate leads coming off of the SCRs. Each of these leads are connected to a quick-disconnect terminal on the suppressor board. Turn the voltage control pot to maximum. Disconnect one lead to one SCR and observe the OCV. If the OCV drops to a lower value, this indicates that this particular SCR is working properly. *Reconnect this lead* and do the same thing with the remaining leads until you discover which disconnection does *not* cause the OCV to drop to a lower level. This is the malfunctioning SCR. See Mounting Procedures for SCRs which follows.

Mounting Procedure for SCRs

1. Thoroughly clean heat sink surface to eliminate any dirt or contamination.

2. Apply a thin coat of Alcoa # 2 compound to cleaned surface. Alcoa # 2 is available from Thermal Arc, part number 903870.

3. Positively locate the SCR in place in the heat sink. A small spring pin in the extruded heat sink will locate the SCR.

4. Place the clamp in position with the bolts through the holes in the heat sink, and proceed in following manner.

5. Tighten the nuts evenly until finger tight.

6. Tighten each bolt in 1/4 turn increments using correct size hex key.

7. Place the Force Indicator Gauge (903878) firmly against the springs as shown. Be sure both ends and the center are in firm contact with the springs. The gauge notch location will indicate the spring deflection or force. Correct mounting force is indicated as shown below.

8. Spring deflection over 2-1/4 inches of spring is .037" ± .002" for all clamps.

9. All clamps to be set at 4° mark. This corresponds to the VE3000-VE2500 section on the gauge label.

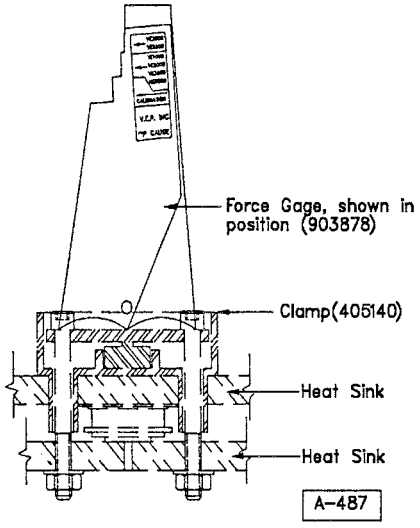
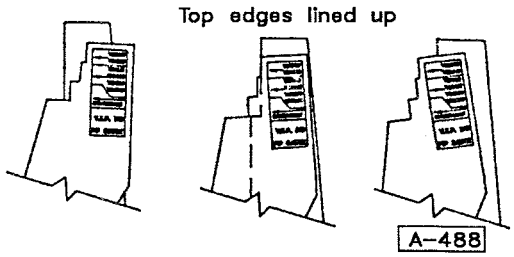


Figure 7-1

Examples:

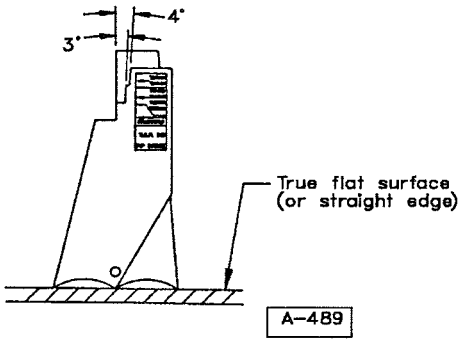


Less than rated force. Tighten nuts alternately 1/4 turn at a time until points coincide.	Correct rated force.	Excessive force. Loosen both nuts and start over. Never adjust force by backing off the nuts. Friction will produce a false reading. Always start from Step 1.

Figure 7-2

To Calibrate Force Gauge:

If the gauge is suspected of being out of calibration due to wear or damage, check it on a flat surface as shown below.



If the calibration edges do not line up, calibrate the gauge by filing the bottom contact points.

Figure 7-3

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PARTS LIST

Equipment Identification

All identification numbers as described in the Introduction chapter must be furnished when ordering parts or making inquiries. This information is usually found on the nameplate attached to the equipment. Be sure to include any dash numbers following the Specification or Assembly numbers.

How To Use This Parts List

The Parts List is a combination of an illustration (Figure Number) and a corresponding list of parts which contains a breakdown of the equipment into assemblies, subassemblies, and detail parts. All parts of the equipment are listed except for commercially available hardware, bulk items such as wire, cable, sleeving, tubing, etc., and permanently attached items which are soldered, riveted, or welded to another part. The part descriptions may be indented to show part relationships.

To determine the part number, description, quantity, or application of an item, simply locate the item in question from the illustration and refer to that item number in the corresponding Parts List.

An "Application Code" is used to distinguish parts that are applicable only to certain Specifications and/or Assemblies. This code is found in the rightmost column of the Parts List. If an item in the Parts List applies to all Specifications or Assemblies, the word "ALL" will be in the Application Code column. Refer to the following list to determine the appropriate Application Codes for the Specifications or Assemblies covered by this manual. If only the assembly or specification number is listed, the use of an Application Code does not apply to this manual.

PART NUMBER	APPLICATION CODE
100002A-1	A
100002A-2	B
100002A-3	C

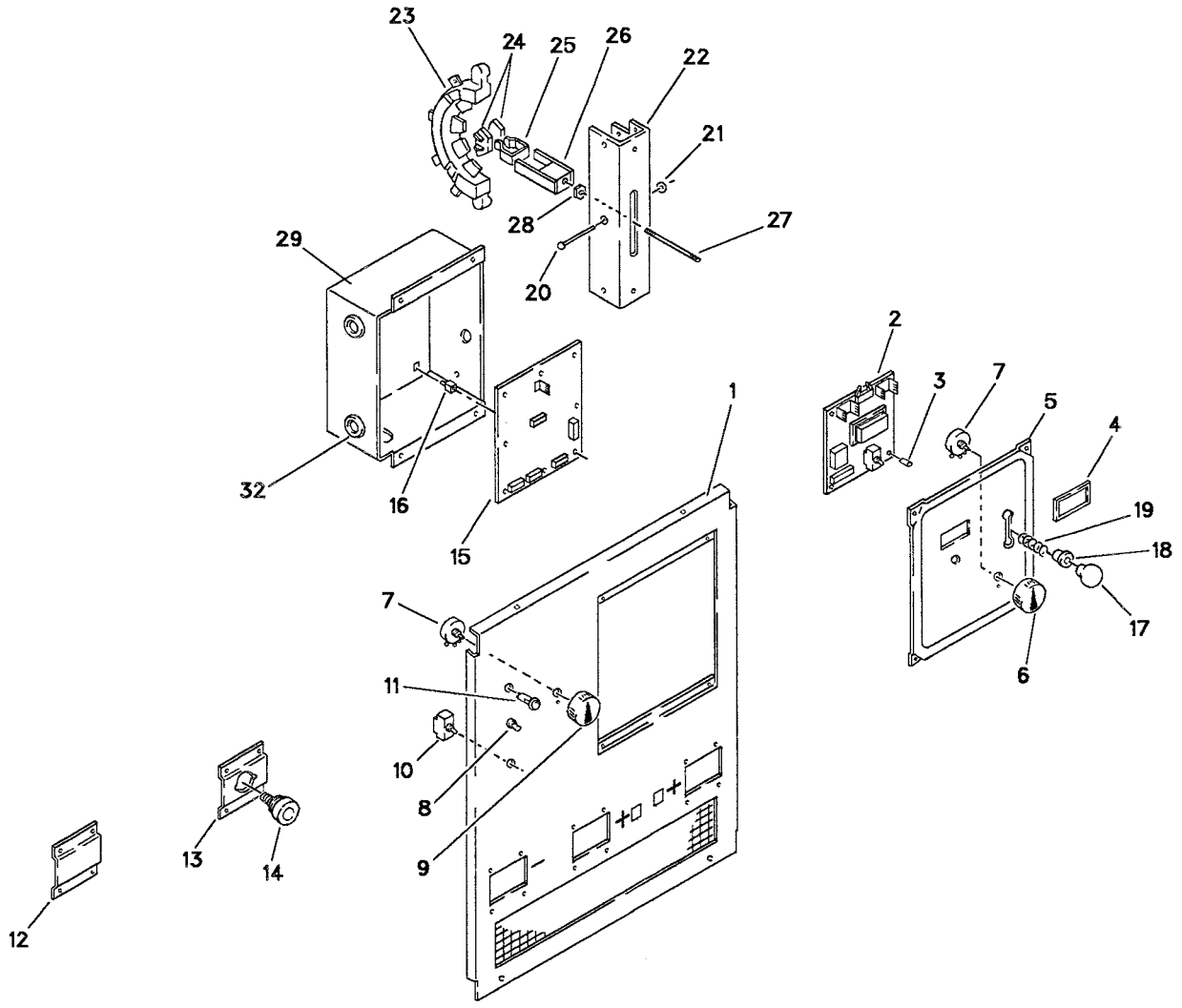

Figure 8-1 EXCEL-ARC® Control Panel Group

Parts List for Figure 8-1

Item No	Part Number	Description	Qty per Assy	Application Code
	100002A-1	Excel-Arc® - 500 CC, 50/60 Hz	1	A
	100002A-2	Excel-Arc® - 6045 CV, 50/60 Hz	1	B
	100002A-3	Excel-Arc® - 6045 CC/CV, 50/60 Hz	1	C
1	830698-1	. Panel - Control	1	All
2	204212	. Board - PC, Digital Display	1	BC
3	204600-2	. Spacer	4	BC
4	409000-1	. Bezel - Meter	1	BC
5	204053-11	. Panel - Control Module	1	A
	204053-8	. Panel - Control Module	1	B
	830207	. Panel - Control Module	1	C
6	406806-3	. Knob - Control	1	AC
7	401428-8	. Potentiometer - Volt/Amp Ctl, Arc Force	2	AC
	401428-8	. Potentiometer - Volt/Amp Ctl, Arc Force	1	B
8	405365-1	. Switch - Toggle, ON/OFF,	2	All
9	408850-5	. Knob - Black	1	All
10	402682	. Switch - Toggle, RMT/LC1	1	All
11	830710-1	. Light - Indicator, Overload	1	All
—	830709-1	. Clip - Retainer	1	All
12	204052-6	. Panel - Output, Blank	1	AB
13	204052-7	. Panel - Output, Terminal	2	AB
	204052-7	. Panel - Output, Terminal	3	C
14	408049-1	. Connector - Locking	2	AB
	408049-1	. Connector - Locking	3	C
15	204207B-1	. Board - PC, Control	1	All
16	171086-1	. Stand-off - PC Board	8	All
17	W-9956	. Knob - Range Switch	1	C
18	367880	. Sleeve - Sw.	1	C
19	400562-24	. Spring - Compression	1	C
	367260-1	. Switch - Range	1	C
20	405478	. . Rivet	1	C
21	W-11291-3	. . Nut - Speed, Push on	1	C
22	410602-1	. . Bracket	1	C
23	410589	. . Contact - Stationary	1	C
24	12RT-238	. . Contact - Movable	2	C
25	410541	. . Spring	1	C
26	910061	. . Guide	1	C
27	W-9549-21	. . Rod - Threaded, 1/4 Dia.	1	C
28	No Number	. . Nut - 1/4-20 SCR, MH, Hex, ST.	1	C
29	830040-1	. Box - Control Board	1	All

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Parts List for Figure 8-1

Item No	Part Number	Description	Qty per Assy	Application Code
30		. Delete		
31		. Delete		
—	204247-1	. Cable - Ribbon, Meter	1	BC
32	405362-3	. Bushing - Snap	2	All

— Not Illustrated

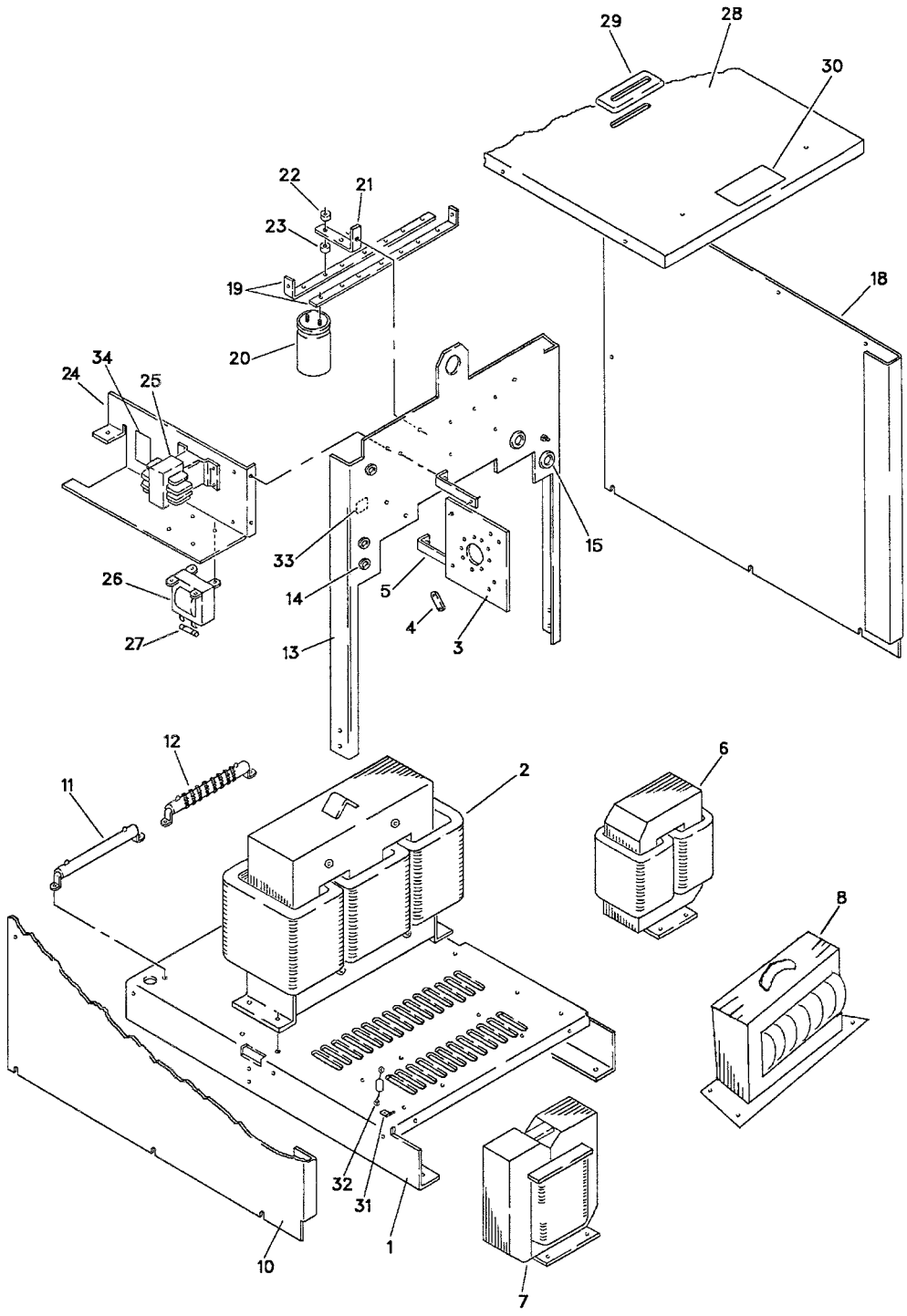

Figure 8-2 Base and Lifting Yoke Group

Parts List for Figure 8-1

Item	Part Number	Description	Qty per Assy	Application Code
1		204054-1	. Base - Welder	1	All
2		204254	. Transformer - Power	1	BC
		830268	. Transformer - Power	1	A
3		367228-12	. . Board - Voltage Changeover	1	All
4		CW-811	. Link - Voltage Changeover	3	All
5		204301-1	. Bracket - Mtg.	2	All
6		204194	. Choke - Filter, CC	1	A
7		204193	. Choke - Filter, CV	1	B
8		830021	. Choke - Filter, CC/CV	1	C
9			. Deleted		
10		830038-1	. Panel - Side, Left	1	All
11		406358-4	. Resistor - Fixed, 175 W	1	BC
12		406358-1	. Resistor - 25 Ohm, 175 W	1	All
13		204060-1	. Yoke - Lifting	1	All
14		402037-33	. Grommet - Rubber	2	All
15		402037-11	. Grommet - Rubber	3	All
16			. Deleted		
17			. Deleted		
18		830037-1	. Panel - Side, Right	1	All
		204099-1	. Capacitor - Assembly	1	BC
19		204152	. . Bus - Capacitor	2	BC
20		405278-15	. . Capacitor	5	BC
21		204301-1	. . Bracket - Mtg.	2	BC
22		409870	. . Washer - Insulating	4	BC
23		409869	. . Bushing - Insulating	4	BC
24		830039-1	. Box - Contactor	1	All
25		405402	. Contactor	1	All
26		406392-2	. Transformer - Control	1	All
27		W-11166-11	. Fuse - 1/2 Amp	1	All
28		830036-1	. Panel - Top	1	All
29		12CW-2170	. Boot - Lifting Eye	1	All
30		204036	. Label - Precautionary	1	All
31		402900	. Terminal - Quick Connect	2	AB
		402900	. Terminal - Quick Connect	3	C
32		368705-36	. Capacitor - W/Leads	2	AB
		368705-36	. Capacitor - W/Leads	3	C
33		830116	. Label - Frame Ground	1	All
34		408891	. Label - Warning	1	All
—		204279	. Label - Voltage Changeover	1	All
—		406484	. Label - Fuse	1	All
—		Not Illustrated			

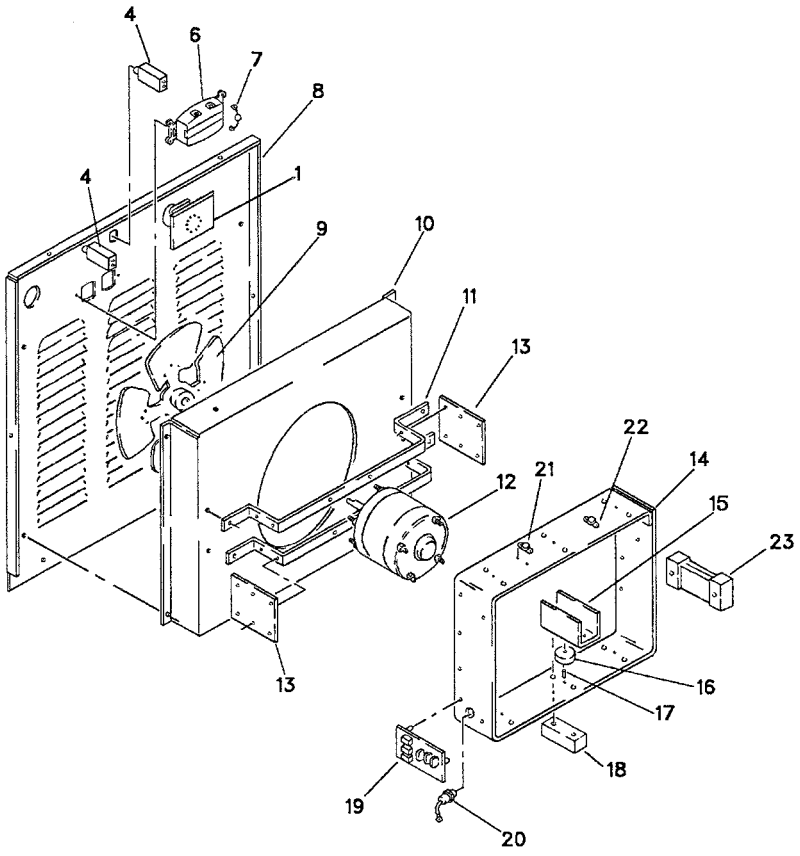

Figure 8-3 Rear Panel Group

Parts List for Figure 8-1

Item No	Part Number	Description	Qty per Assy	Application Code
1	830173-2	. Board, P.C. - Amphenol	1	BC
2		. Deleted		
3		. Deleted		
4	203627-7	. Breaker - Circuit, 10 A	2	BC
	203627-7	. Breaker - Circuit, 10 A	1	A
5		Delete		
6	402670	. Receptacle - 115 V.	1	All
7	366826-1	. Suppressor - Assembly	1	All
8	830212-1	. Panel - Rear	1	All
9	8RT-609	. Blade - Fan	1	All
10	369650-1	. Shroud - Fan	1	All
11	369640-1	. Bracket - Mtg. Fan	2	All
12	12TW-595-1	. Motor - Fan	1	All
13	369641	. Insulator - Mtg.	2	All
14	369639	. Heat Sink - Rectifier	1	All
15	369642	. Heat Sink - SCR	6	All
16	405139	. Rectifier - Silicon	6	All
17	16DA-954-12	. Pin - Spring	6	All
18	405140-1	. Clamp - Mtg.	6	All
19	204210	. Board - Suppressor	2	All
20	402832-3	. Diode - Flyback	1	All
21	404044-6	. Thermostat - Fan	1	All
22	404044-3	. Thermostat - Overload	1	All
23	367732	. Shunt	1	All
—	204038-1	. Cable - Ribbon, Amphenol	1	BC
—	903914-1	. Cap - Protective	1	BC
—	903914-2	. Cap - Protective	1	BC
—	403091-14	. Plug - Hole	1	All
24		. Delete		
25		. Delete		
—	170919-2	. Plug - Hole	1	A
—	W-10080-5	. Clamp- Cable	1	All
—	Not Illustrated			

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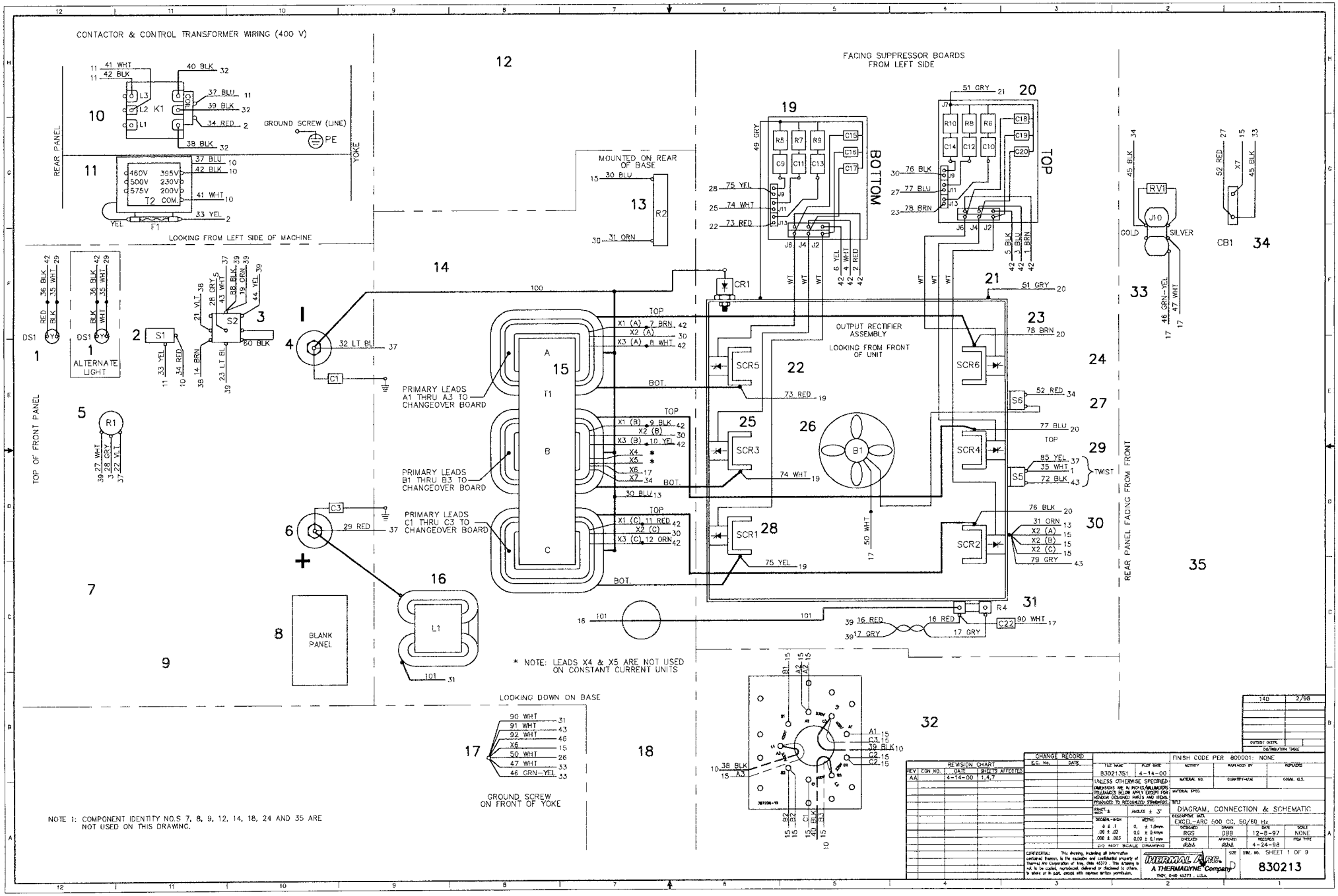
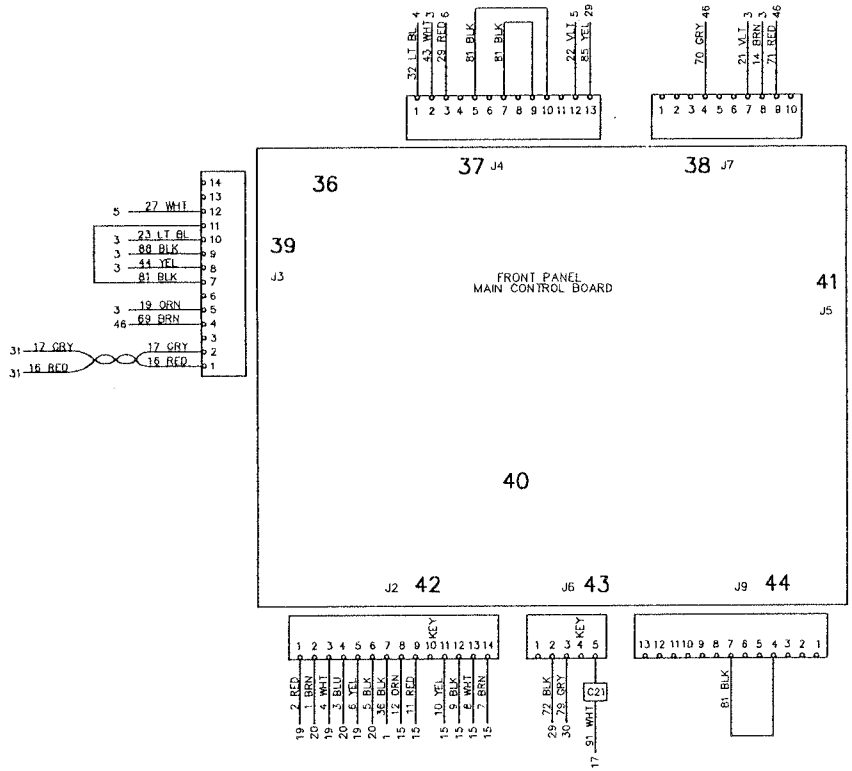
DIAGRAMS

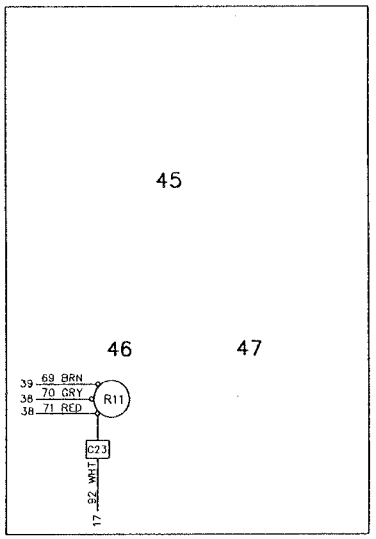
- Note the model and part number shown on the equipment nameplate.
- Locate these numbers in the model and part number columns below.
- Use only those diagrams and instructions that are applicable.

MODEL NO.	PART NUMBER	CONNECTION DIAGRAM	SCHEMATIC DIAGRAM	VOLTAGE CHANGEOVER DIAGRAM
EXCEL-ARC® 500	100002A-1	830213 Sheet 1 & 2	830213 Sheet 3	204278
EXCEL-ARC® 6045	100002A-2	830213 Sheet 4 & 5	830213 Sheet 6	204278
	100002A-3	830213 Sheet 7 & 8	830213 Sheet 9	204278


CONTACTOR & CONTROL TRANSFORMER WIRING (400 V)
REAR PANEL
YOKE
GROUND SCREW (LINE)
PE
K1
T2
F1
LOOKING FROM LEFT SIDE OF MACHINE
MOUNTED ON REAR OF BASE
R2
FACING SUPPRESSOR BOARDS FROM LEFT SIDE
BOTTOM
TOP
CR1
OUTPUT RECTIFIER ASSEMBLY
LOOKING FROM FRONT OF UNIT
SCR1
SCR2
SCR3
SCR4
SCR5
SCR6
B1
RV1
GOLD
SILVER
CB1
S1
S2
S5
S6
R1
R4
C22
DS1
ALTERNATE LIGHT
T1
A
B
C
PRIMARY LEADS A1 THRU A3 TO CHANGEOVER BOARD
PRIMARY LEADS B1 THRU B3 TO CHANGEOVER BOARD
PRIMARY LEADS C1 THRU C3 TO CHANGEOVER BOARD
TOP OF FRONT PANEL
REAR PANEL FACING FROM FRONT
BLANK PANEL
L1
TWIST
* NOTE: LEADS X4 & X5 ARE NOT USED ON CONSTANT CURRENT UNITS
LOOKING DOWN ON BASE
GROUND SCREW ON FRONT OF YOKE
NOTE 1: COMPONENT IDENTITY NO.S 7, 8, 9, 12, 14, 18, 24 AND 35 ARE NOT USED ON THIS DRAWING.
REVISION CHART
CHANGE RECORD
DIAGRAM, CONNECTION & SCHEMATIC
EXCEL-ARC 500 CC, 50/60 Hz
THERMAL ARC
A THERMADYNE Company
830213
SHEET 1 OF 9



FACING REAR OF INSERT PANEL



NOTE 1: COMPONENT IDENTITY NO.S 36, 40, 41, 45 AND 47 ARE NOT USED ON THIS DRAWING.

156	2/98
501	2/98

DISTRIBUTION TABLE

CHANGE RECORD				FINISH CODE PER 800001: NONE			
E.C. No.	DATE	FILE NAME	PLOT SIZE	ACTIVITY	RELEASED BY		REPLACES
		830213S2	4-23-98				
		UNLESS OTHERWISE SPECIFIED		MATERIAL NO.	QUANTITY-U.M.		CODE D.S.
		DIMENSIONS ARE IN INCHES/MILLIMETERS TOLERANCES BELOW APPLY EXCEPT FOR VENDOR DESIGNED PARTS AND DETAILS PRODUCED TO RECOGNIZED STANDARDS.		MATERIAL SPEC.			
		FRACT ±	ANGLES ± 3°	TITLE: DIAGRAM, CONNECTION & SCHEMATIC			
		DECIMAL-PLACE	MCTRIC	DESCRIPTIVE UNIT: EXCEL-ARC 500 CC, 50/60 HZ			
		.0 ± .1	0. ± 1.0mm	DESIGNED	DRAWN	DATE	SCALE
		.00 ± .02	0.0 ± 0.4mm	RGS	DBB	12-8-97	NONE
		.000 ± .003	0.00 ± 0.1mm	CHECKED	APPROVED	RELEASED	ITEM TYPE
		DO NOT SCALE DRAWING		RJS	RJS	4-24-98	

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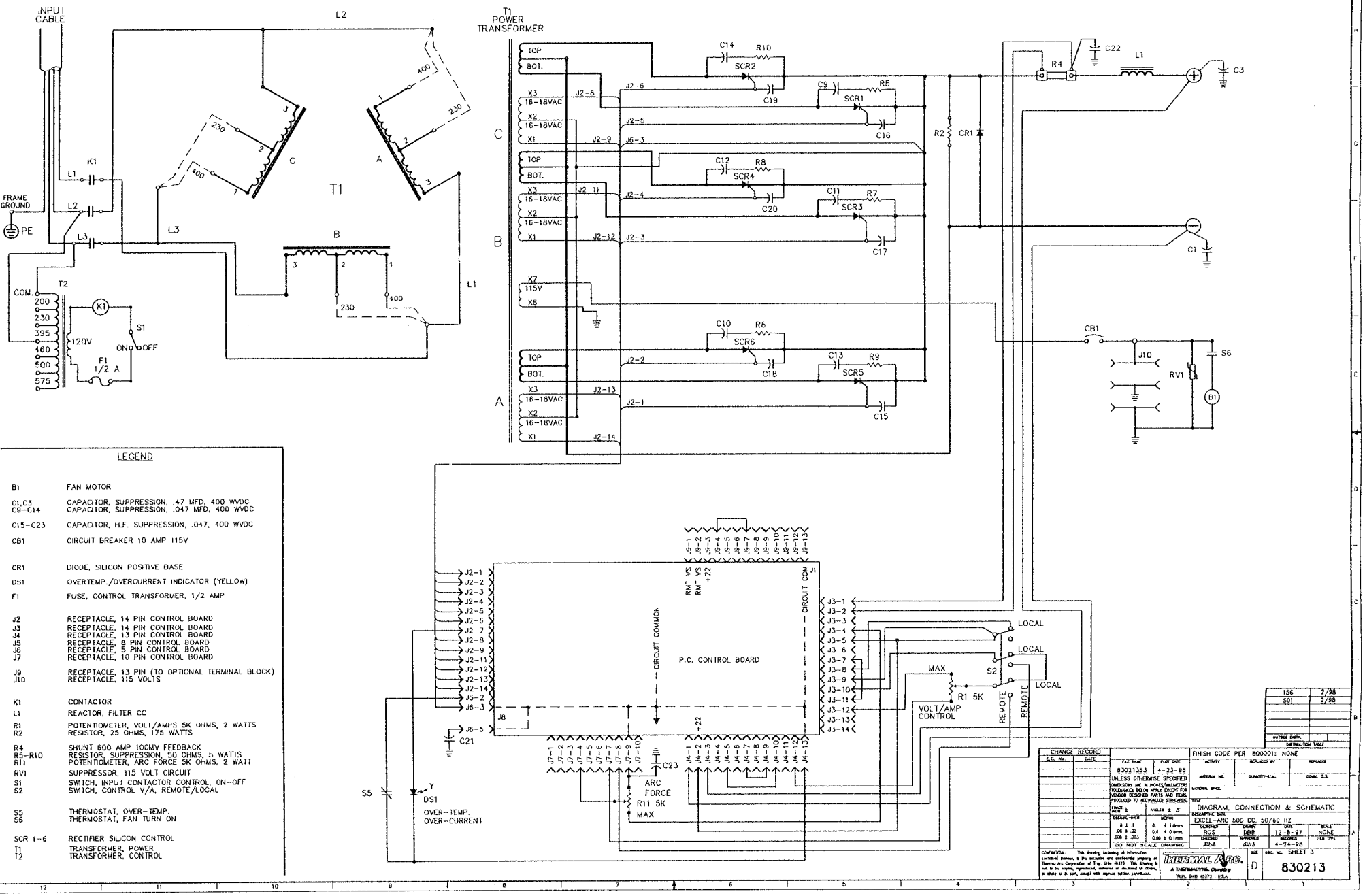
THERMAL ARC
A THERMADYNE Company
TROY, OHIO 45373 U.S.A.

SIZE D | DWG. NO. 830213 | SHEET 2



LEGEND

B1	FAN MOTOR
C1,C3 C9-C14	CAPACITOR, SUPPRESSION, .47 MFD, 400 WVDC CAPACITOR, SUPPRESSION, .047 MFD, 400 WVDC
C15-C23	CAPACITOR, H.F. SUPPRESSION, .047, 400 WVDC
CB1	CIRCUIT BREAKER 10 AMP 115V
CR1	DIODE, SILICON POSITIVE BASE
DS1	OVERTEMP./OVERCURRENT INDICATOR (YELLOW)
F1	FUSE, CONTROL TRANSFORMER, 1/2 AMP
J2	RECEPTACLE, 14 PIN CONTROL BOARD
J3	RECEPTACLE, 14 PIN CONTROL BOARD
J4	RECEPTACLE, 13 PIN CONTROL BOARD
J5	RECEPTACLE, 8 PIN CONTROL BOARD
J6	RECEPTACLE, 5 PIN CONTROL BOARD
J7	RECEPTACLE, 10 PIN CONTROL BOARD
J9 J10	RECEPTACLE, 13 PIN (TO OPTIONAL TERMINAL BLOCK) RECEPTACLE, 115 VOLTS
K1	CONTACTOR
L1	REACTOR, FILTER CC
R1 R2	POTENTIOMETER, VOLT/AMPS 5K OHMS, 2 WATTS RESISTOR, 25 OHMS, 175 WATTS
R4 R5-R10 R11	SHUNT 600 AMP 100MV FEEDBACK RESISTOR, SUPPRESSION, 50 OHMS, 5 WATTS POTENTIOMETER, ARC FORCE 5K OHMS, 2 WATT
RV1	SUPPRESSOR, 115 VOLT CIRCUIT
S1 S2	SWITCH, INPUT CONTACTOR CONTROL, ON--OFF SWITCH, CONTROL V/A, REMOTE/LOCAL
S5 S6	THERMOSTAT, OVER-TEMP. THERMOSTAT, FAN TURN ON
SCR 1-6	RECTIFIER SILICON CONTROL
T1 T2	TRANSFORMER, POWER TRANSFORMER, CONTROL

CHANGE RECORD							
E.C. No.	DATE						
		PART NUMBER	PART DATE				
		830213&3	4-23-88				
		UNLESS OTHERWISE SPECIFIED					
		DIMENSIONS ARE IN INCHES/MILLIMETERS					
		TOLERANCES BELOW APPLY EXCEPT FOR					
		VENDOR DESIGNED PARTS AND ITEMS.					
		PRODUCED TO RECOGNIZED STANDARDS					
		FRACT ±	ANGLES ± 1°				
		DECIMAL=INCH	METRIC				
		.0 ± .1	0. ± 1.0mm				
		.00 ± .02	0.0 ± 0.4mm				
		.000 ± .005	0.00 ± 0.1mm				
		DO NOT SCALE DRAWING					

FINISH CODE PER 800001: NONE

ACTIVITY	REPLACED BY	REPLACES
MATERIAL NO.	QUANTITY-U/A	COMP. O.S.
MATERIAL SPEC.		

TITLE: DIAGRAM, CONNECTION & SCHEMATIC

DESCRIPTIVE SIZE: EXCEL-ARC 500 CC, 50/60 HZ

DESIGNED	DRAWN	DATE	SCALE
RGS	DBB	12-8-97	NONE
CHECKED	APPROVED	RECORDED	ITEM TYPE
ABA	ABA	4-24-98	

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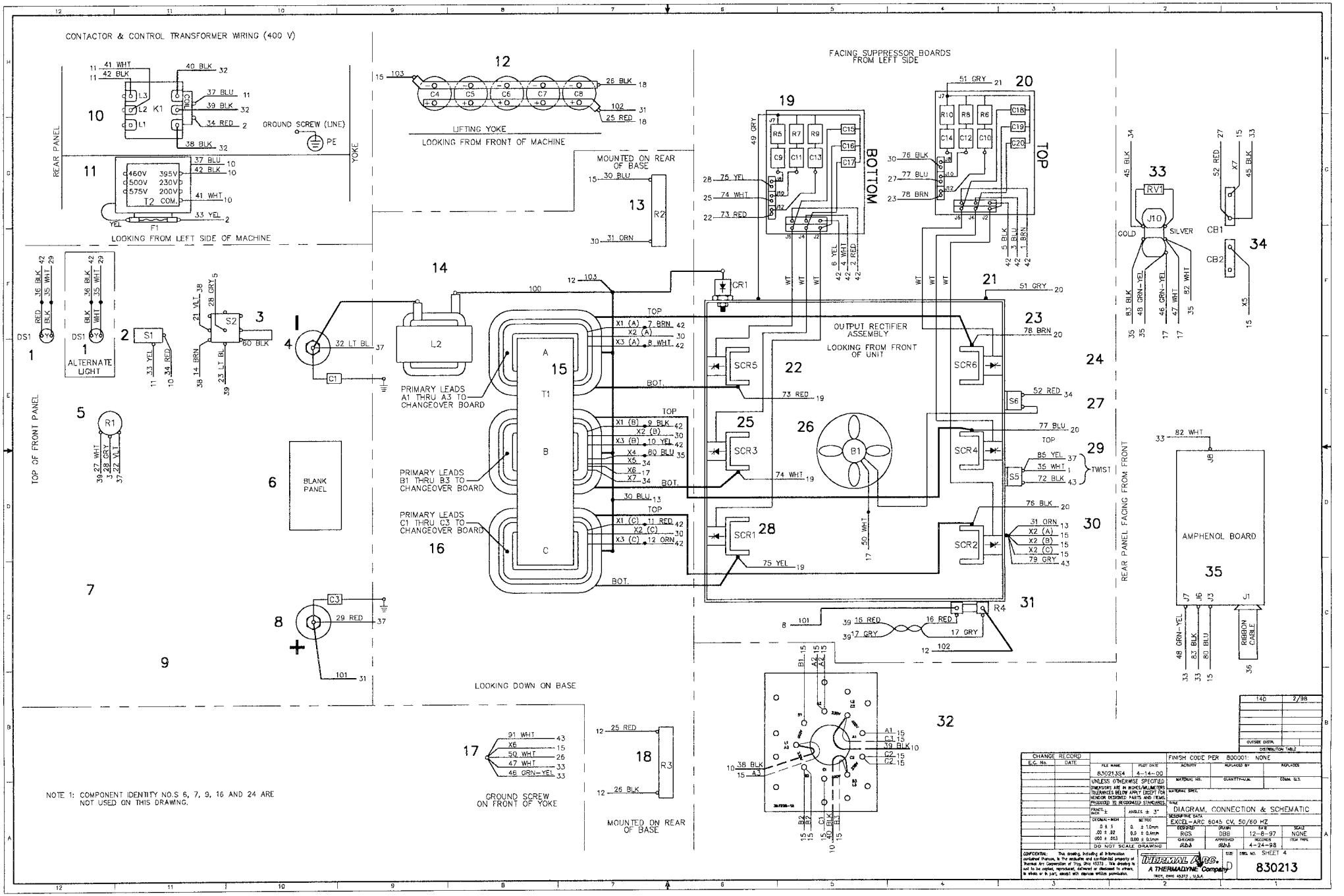
THERMAL ARC. A THERMADYNE Company TROY, OHIO 45373 U.S.A.

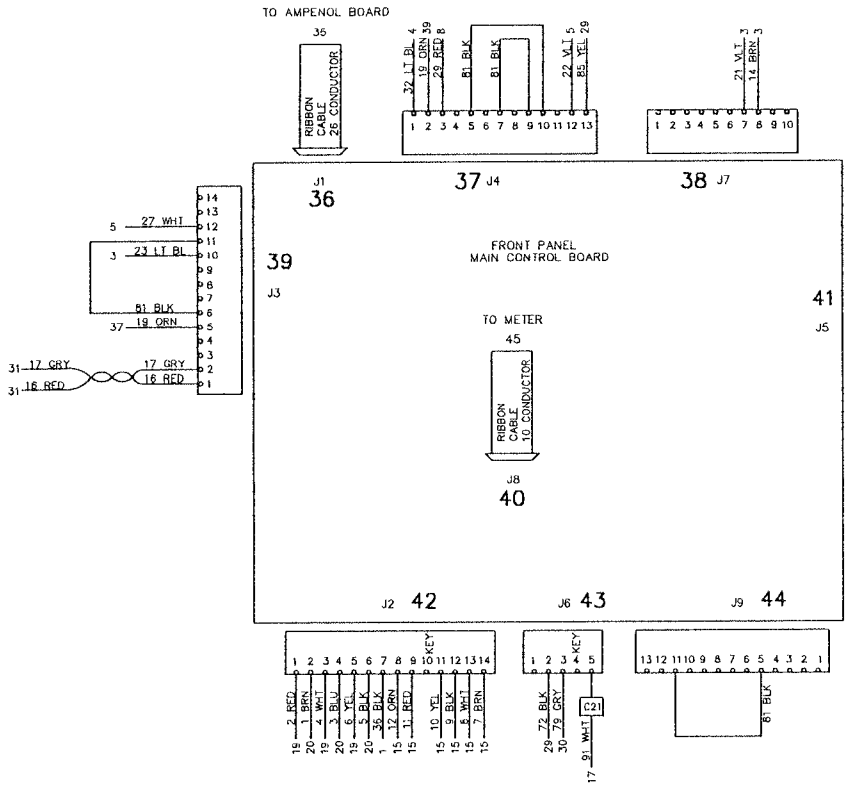
SIZE: D | DWG. NO. 830213 | SHEET 3

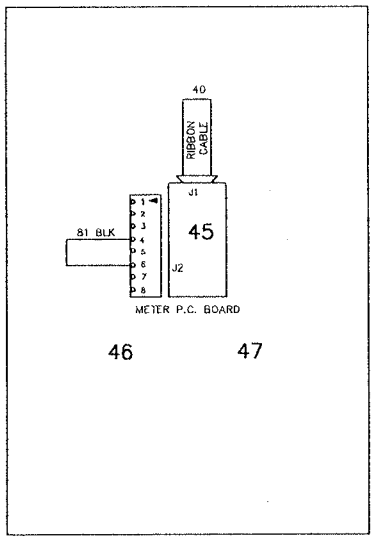
156	2/98
S01	2/98

OUTSIDE DIMEN.

DISTRIBUTION TABLE


CONTACTOR & CONTROL TRANSFORMER WIRING (400 V)
REAR PANEL
YOKE
GROUND SCREW (LINE)
PE
K1
T2
460V 395V
500V 230V
575V 200V
COM.
F1
LOOKING FROM LEFT SIDE OF MACHINE
LIFTING YOKE
LOOKING FROM FRONT OF MACHINE
MOUNTED ON REAR OF BASE
R2
FACING SUPPRESSOR BOARDS FROM LEFT SIDE
BOTTOM
TOP
OUTPUT RECTIFIER ASSEMBLY
LOOKING FROM FRONT OF UNIT
CR1
SCR1
SCR2
SCR3
SCR4
SCR5
SCR6
L2
T1
A
B
C
PRIMARY LEADS A1 THRU A3 TO CHANGEOVER BOARD
PRIMARY LEADS B1 THRU B3 TO CHANGEOVER BOARD
PRIMARY LEADS C1 THRU C3 TO CHANGEOVER BOARD
B1
R4
RV1
COLD
SILVER
CB1
CB2
AMPHENOL BOARD
RIBBON CABLE
REAR PANEL FACING FROM FRONT
TOP OF FRONT PANEL
ALTERNATE LIGHT
BLANK PANEL
LOOKING DOWN ON BASE
MOUNTED ON REAR OF BASE
GROUND SCREW ON FRONT OF YOKE
NOTE 1: COMPONENT IDENTITY NO.S 6, 7, 9, 16 AND 24 ARE NOT USED ON THIS DRAWING.
DIAGRAM, CONNECTION & SCHEMATIC
EXCEL-ARC 6045 CV, 50/60 HZ
830213S4
4-14-00
4-24-98
12-8-97
THERMAL ARC
A THERMADYNE Company
SHEET 4
830213





NOTE 1: COMPONENT IDENTITY NO.S 41, 46, AND 47 ARE NOT USED ON THIS DRAWING.

156	2/98
501	2/98

DISTRIBUTION TABLE

CHANGE RECORD

E.C. No.	DATE

FINISH CODE PER 800001: NONE

FILE NAME	PLOT DATE
83021355	4-23-98

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES/MILLIMETERS
TOLERANCES BELOW APPLY EXCEPT FOR VENDOR DESIGNED PARTS AND ITEMS PRODUCED TO REFERENCED SPECIFICATIONS

ANGLES ± 1°	
DECIMAL-INCH	METRIC
.0 ± .1	.0 ± 1.0mm
.00 ± .02	.00 ± 0.4mm
.000 ± .001	.000 ± 0.1mm

DO NOT SCALE DRAWING

ACTIVITY | REPLACED BY | REPLACES
MATERIAL NO. | QUANTITY-USA | CONT. U.S.
MATERIAL SPEC.

TITLE: DIAGRAM, CONNECTION & SCHEMATIC
DESCRIPTIVE NOTE: EXCEL-ARC 6045 CV, 50/60 HZ

DESIGNED	DRAWN	DATE	SCALE
RGS	DBB	12-8-97	NONE
CHECKED	APPROVED	RELEASED	ITEM TYPE
JGS-5	JGS-5	4-24-98	

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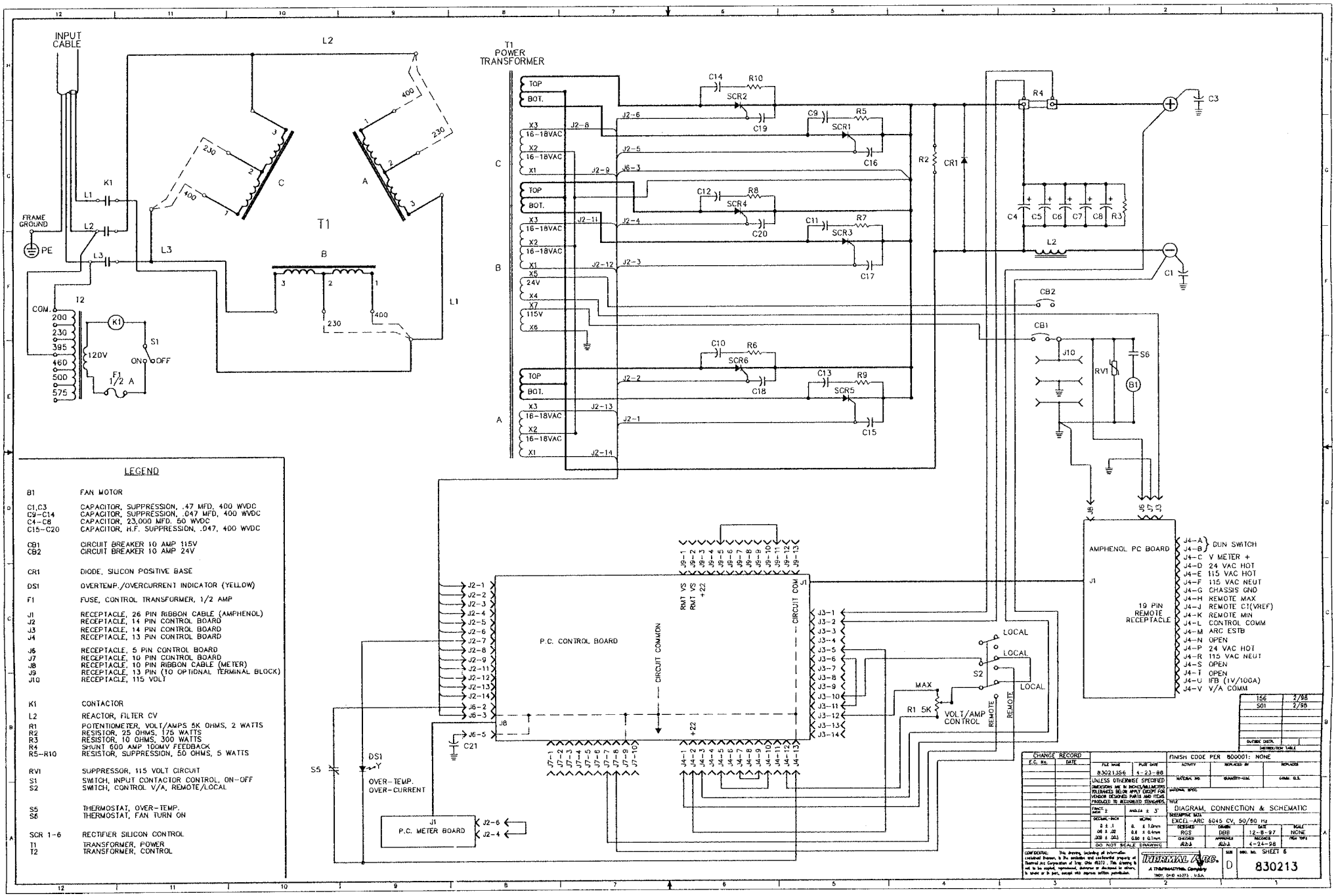
TROY, OHIO 45373 U.S.A.

SIZE D | DWG. NO. 830213 | SHEET 5



LEGEND

B1	FAN MOTOR
C1,C3	CAPACITOR, SUPPRESSION, .47 MFD, 400 WVDC
C9–C14	CAPACITOR, SUPPRESSION, .047 MFD, 400 WVDC
C4–C8	CAPACITOR, 23,000 MFD. 50 WVDC
C15–C20	CAPACITOR, H.F. SUPPRESSION, .047, 400 WVDC
CB1	CIRCUIT BREAKER 10 AMP 115V
CB2	CIRCUIT BREAKER 10 AMP 24V
CR1	DIODE, SILICON POSITIVE BASE
DS1	OVERTEMP./OVERCURRENT INDICATOR (YELLOW)
F1	FUSE, CONTROL TRANSFORMER, 1/2 AMP
J1	RECEPTACLE, 26 PIN RIBBON CABLE (AMPHENOL)
J2	RECEPTACLE, 14 PIN CONTROL BOARD
J3	RECEPTACLE, 14 PIN CONTROL BOARD
J4	RECEPTACLE, 13 PIN CONTROL BOARD
J6	RECEPTACLE, 5 PIN CONTROL BOARD
J7	RECEPTACLE, 10 PIN CONTROL BOARD
J8	RECEPTACLE, 10 PIN RIBBON CABLE (METER)
J9	RECEPTACLE, 13 PIN (TO OPTIONAL TERMINAL BLOCK)
J10	RECEPTACLE, 115 VOLT
K1	CONTACTOR
L2	REACTOR, FILTER CV
R1	POTENTIOMETER, VOLT/AMPS 5K OHMS, 2 WATTS
R2	RESISTOR, 25 OHMS, 175 WATTS
R3	RESISTOR, 10 OHMS, 300 WATTS
R4	SHUNT 500 AMP 100MV FEEDBACK
R5–R10	RESISTOR, SUPPRESSION, 50 OHMS, 5 WATTS
RV1	SUPPRESSOR, 115 VOLT CIRCUIT
S1	SWITCH, INPUT CONTACTOR CONTROL, ON–OFF
S2	SWITCH, CONTROL V/A, REMOTE/LOCAL
S5	THERMOSTAT, OVER–TEMP.
S6	THERMOSTAT, FAN TURN ON
SCR 1–6	RECTIFIER SILICON CONTROL
T1	TRANSFORMER, POWER
T2	TRANSFORMER, CONTROL

CHANGE RECORD E.C. No.	DATE
156	2/98
S01	2/98

FILE NAME	PLOT DATE
830213S6	4-23-98

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES/MILLIMETERS
TOLERANCES BELOW ARE NOT EXCEPT FOR VENDOR DESIGNED PARTS AND ITEMS PRODUCED TO RECOGNIZED STANDARDS.

FRACT ± | ANGLES ± 3°
DECIMAL-INCH | METRIC
.X ± .1 | X ± 1.0mm
.XX ± .02 | .XX ± 0.4mm
.XXX ± .001 | .XXX ± 0.1mm
DO NOT SCALE DRAWING

FINISH CODE PER 800001: NONE

ACTIVITY	RELEASED BY	RELEASE
MATERIAL NO.	QUANTITY-U/M.	COMP. U.S.
MATERIAL SPEC.		

TITLE: DIAGRAM, CONNECTION & SCHEMATIC
DESCRIPTIVE DATA: EXCEL-ARC 6045 CV, 50/60 Hz

DESIGNED	DRAWN	DATE	SCALE
RGS	DBB	12-8-97	NONE
CHECKED	APPROVED	RELEASED	PROJ. TYPE
ABA	ABA	4-24-98	

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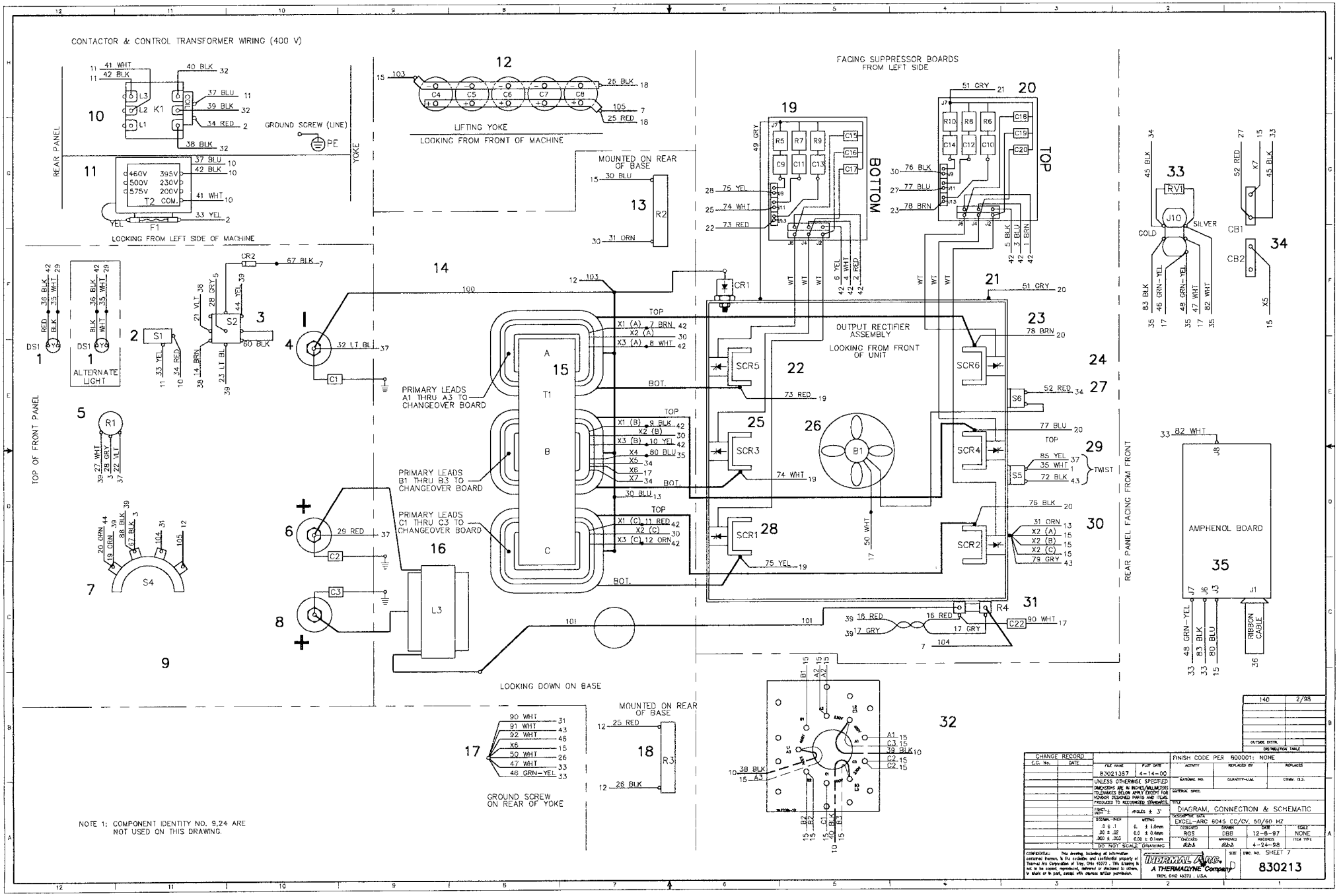
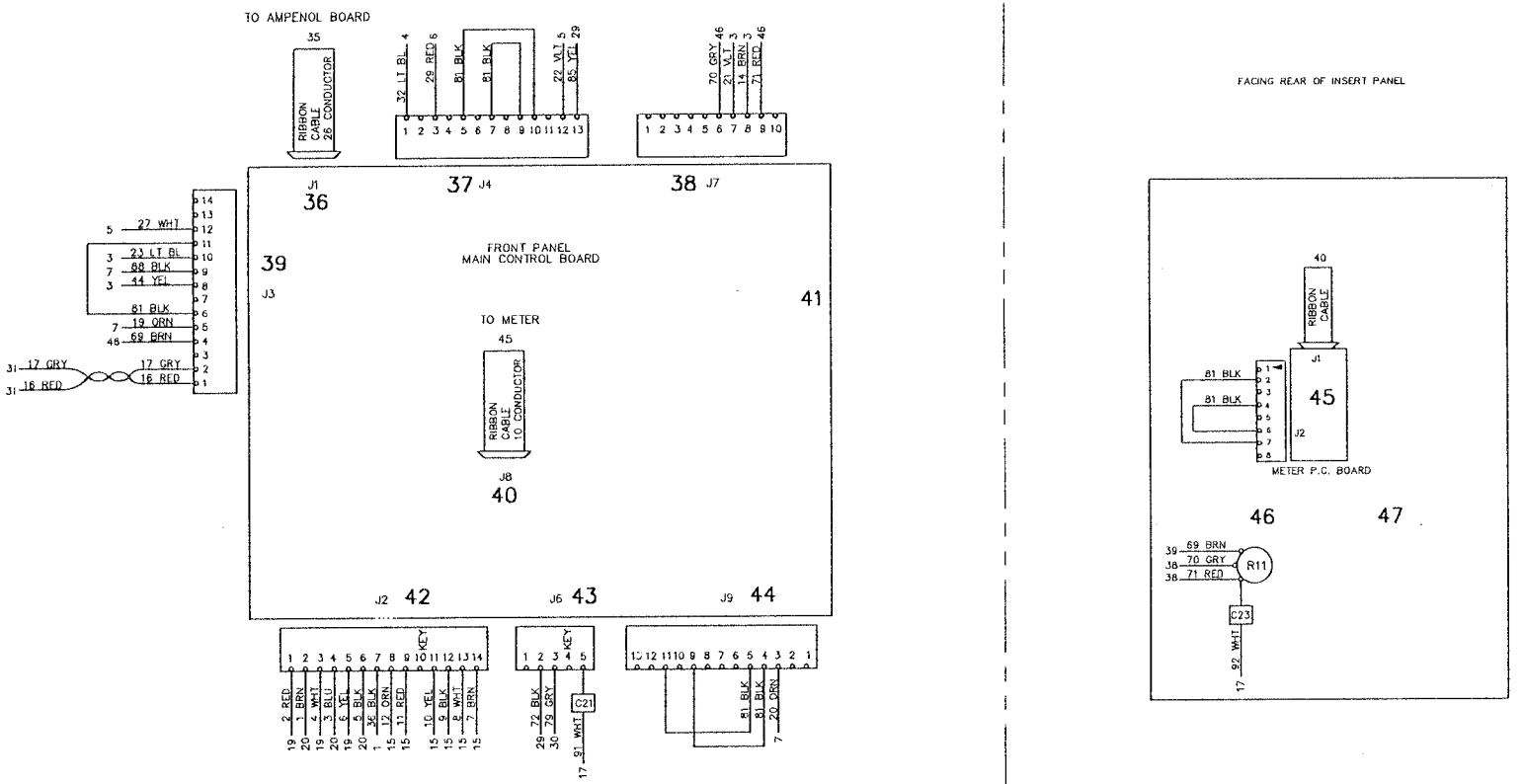
SIZE D | DWG. NO. 830213 | SHEET 6


CONTACTOR & CONTROL TRANSFORMER WIRING (400 V)
REAR PANEL
YOKE
GROUND SCREW (LINE)
PE
LOOKING FROM LEFT SIDE OF MACHINE
LIFTING YOKE
LOOKING FROM FRONT OF MACHINE
MOUNTED ON REAR OF BASE
FACING SUPPRESSOR BOARDS FROM LEFT SIDE
BOTTOM
TOP
OUTPUT RECTIFIER ASSEMBLY
LOOKING FROM FRONT OF UNIT
ALTERNATE LIGHT
PRIMARY LEADS A1 THRU A3 TO CHANGEOVER BOARD
PRIMARY LEADS B1 THRU B3 TO CHANGEOVER BOARD
PRIMARY LEADS C1 THRU C3 TO CHANGEOVER BOARD
TOP OF FRONT PANEL
REAR PANEL FACING FROM FRONT
AMPHENOL BOARD
RIBBON CABLE
LOOKING DOWN ON BASE
MOUNTED ON REAR OF BASE
GROUND SCREW ON REAR OF YOKE
NOTE 1: COMPONENT IDENTITY NO. 9,24 ARE NOT USED ON THIS DRAWING.
DIAGRAM, CONNECTION & SCHEMATIC
EXCEL-ARC 6045 CC/CV, 50/60 HZ
830213
THERMAL ARC
A THERMADYNE Company
TROY, OHIO 45373, U.S.A.



NOTE 1: COMPONENT IDENTITY NO.S 41, AND 47 ARE NOT USED ON THIS DRAWING.

156	2/98
501	2/98

CHANGE RECORD

E.C. No. | DATE

FILE NAME: 830213S0 | PLOT DATE: 4-23-98

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES/MILLIMETERS
TOLERANCES BELOW APPLY EXCEPT FOR VENDOR DESIGNED PARTS AND ITEMS PROVIDED TO MECHANIZED STANDARDS

FRACT. ± | ANGLES ± 3°

DECIMAL - INCH: .X ± .1; .XX ± .02; .XXX ± .003
METRIC: .0 ± 1.0mm; .X ± 0.4mm; .XX ± 0.1mm

DO NOT SCALE DRAWING

FINISH CODE PER 800001: NONE

ACTIVITY | REPLACED BY | REPLACES
MATERIAL NO. | QUANTITY-U/M | COMM. U.S.
MATERIAL SPEC.

TITLE: DIAGRAM, CONNECTION & SCHEMATIC
DESCRIPTIVE DATA: EXCEL-ARC 6045 CC/CV, 50/60 HZ

DESIGNED	DRAWN	DATE	SCALE
RGS	DBB	12-8-97	NONE
CHECKED	APPROVED	RECORDER	REV TYPE
ADJ	ADJ	4-24-98	

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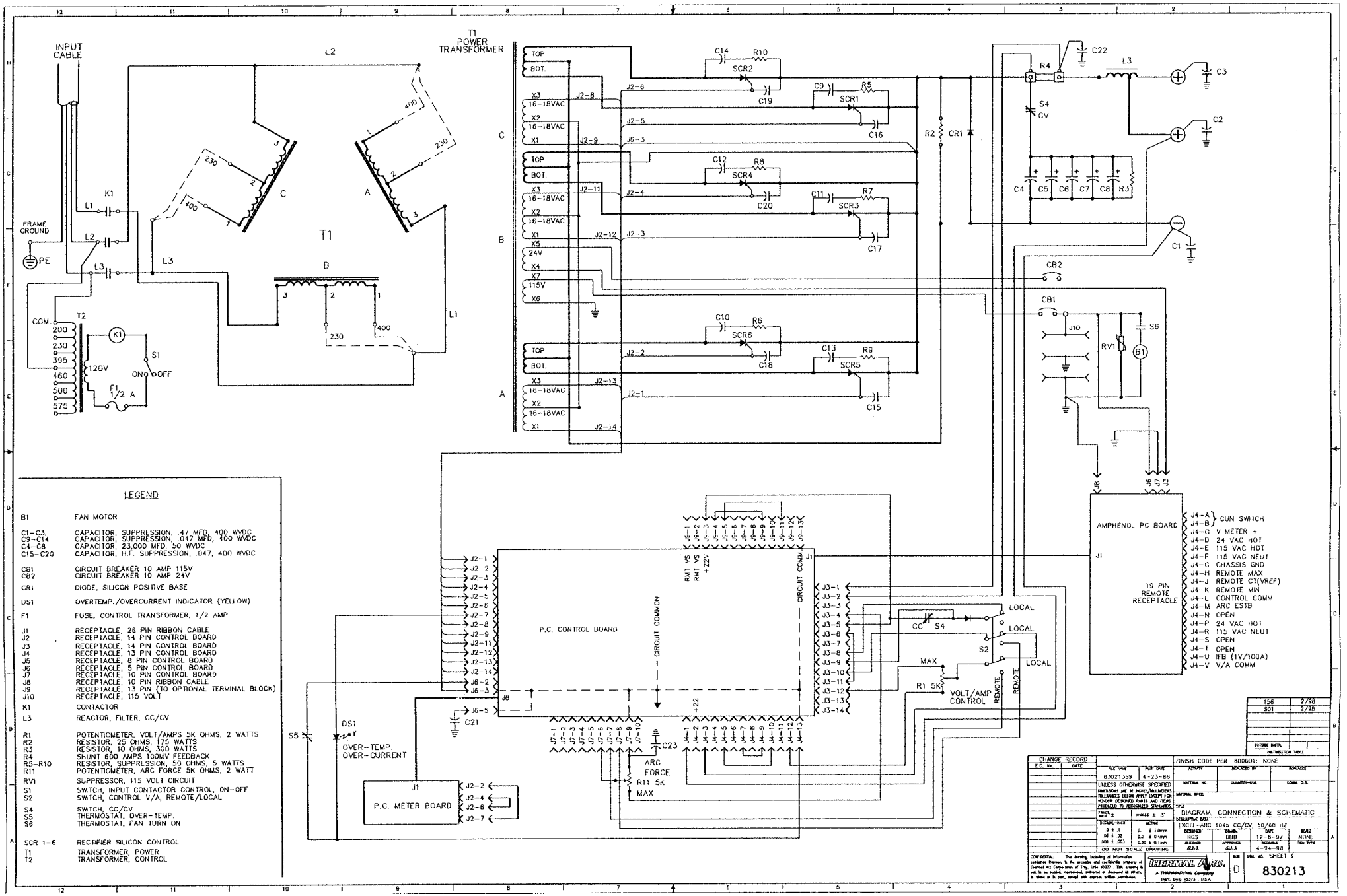
TROY, OHIO 45373 - U.S.A.

SIZE: D | DRG. NO. 830213 | SHEET 8

OUTDOC CHECK | DISTRIBUTION TABLE



LEGEND

B1	FAN MOTOR
C1–C3, C9–C14, C4–C8, C15–C20	CAPACITOR, SUPPRESSION, .47 MFD, 400 WVDC CAPACITOR, SUPPRESSION, .047 MFD, 400 WVDC CAPACITOR, 23,000 MFD, 50 WVDC CAPACITOR, H.F. SUPPRESSION, .047, 400 WVDC
CB1 CB2	CIRCUIT BREAKER 10 AMP 115V CIRCUIT BREAKER 10 AMP 24V
CR1	DIODE, SILICON POSITIVE BASE
DS1	OVERTEMP./OVERCURRENT INDICATOR (YELLOW)
F1	FUSE, CONTROL TRANSFORMER, 1/2 AMP
J1 J2 J3 J4 J5 J6 J7 J8 J9 J10	RECEPTACLE, 26 PIN RIBBON CABLE RECEPTACLE, 14 PIN CONTROL BOARD RECEPTACLE, 14 PIN CONTROL BOARD RECEPTACLE, 13 PIN CONTROL BOARD RECEPTACLE, 8 PIN CONTROL BOARD RECEPTACLE, 5 PIN CONTROL BOARD RECEPTACLE, 10 PIN CONTROL BOARD RECEPTACLE, 10 PIN RIBBON CABLE RECEPTACLE, 13 PIN (TO OPTIONAL TERMINAL BLOCK) RECEPTACLE, 115 VOLT
K1	CONTACTOR
L3	REACTOR, FILTER, CC/CV
R1 R2 R3 R4 R5–R10 R11	POTENTIOMETER, VOLT/AMPS 5K OHMS, 2 WATTS RESISTOR, 25 OHMS, 175 WATTS RESISTOR, 10 OHMS, 300 WATTS SHUNT 600 AMPS 100MV FEEDBACK RESISTOR, SUPPRESSION, 50 OHMS, 5 WATTS POTENTIOMETER, ARC FORCE 5K OHMS, 2 WATT
RV1	SUPPRESSOR, 115 VOLT CIRCUIT
S1 S2	SWITCH, INPUT CONTACTOR CONTROL, ON-OFF SWITCH, CONTROL V/A, REMOTE/LOCAL
S4 S5 S6	SWITCH, CC/CV THERMOSTAT, OVER-TEMP. THERMOSTAT, FAN TURN ON
SCR 1–6	RECTIFIER SILICON CONTROL
T1 T2	TRANSFORMER, POWER TRANSFORMER, CONTROL

156	2/98
S01	2/98

CHANGE RECORD				FINISH CODE PER 800001: NONE			
E.C. No.	DATE	FILE NAME	PLOT DATE	ACTIVITY	DRAWN BY		ACHIEVED
		830213S9	4-23-98				
		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES BELOW APPLY EXCEPT FOR VENDOR DESIGNED PARTS AND ITEMS. CONFORM TO RECOGNIZED STANDARDS.		MATERIAL NO.	QUANTITY/UNIT		COMM. G.S.
		FRACT ±	ANGLES ± 5°	MATERIAL SPEC.			
		DECIMAL-INCH	METRIC	TITLE			
		.X ± .1	X ± 1.0mm	DIAGRAM, CONNECTION & SCHEMATIC			
		.XX ± .02	.XX ± 0.4mm	DESCRIPTIVE NAME			
		.XXX ± .003	.XXX ± 0.1mm	EXCEL-ARC 6045 CC/CV, 50/60 HZ			
		DO NOT SCALE DRAWING		DESIGNED	DRAWN	DATE	SCALE
				NGS	DBB	12-8-97	NONE
				CHECKED	APPROVED	RELEASED	FIRM TYPE
				RJJ	RJJ	4-24-98	

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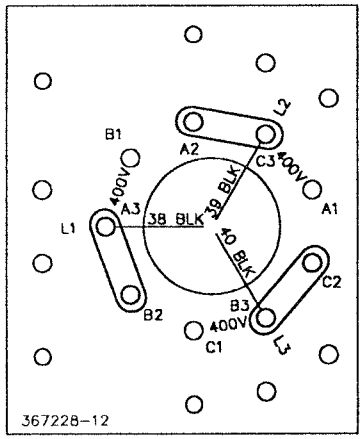
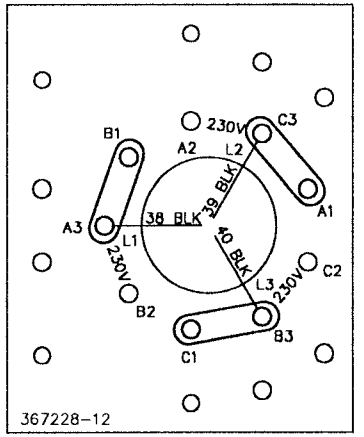
THERMAL ARC. A THERMADYNE Company TROY, OHIO 45373, U.S.A.

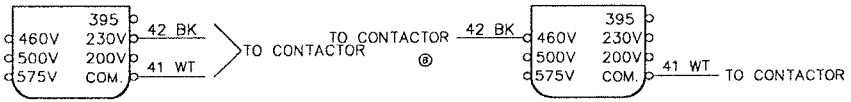
SIZE D | DWG. NO. 830213 | SHEET 9

230 VOLT CONNECTION



400 VOLT CONNECTION





CONTROL TRANSFORMER BELOW CONTACTOR

FIG: 1

CONTROL TRANSFORMER BELOW CONTACTOR

FIG: 2

INPUT CABLE DIAGRAM

SEE NOTE 3

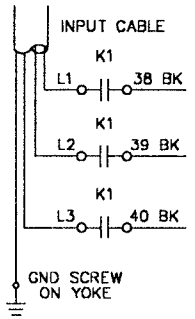


FIG: 3

INSTRUCTIONS FOR VOLTAGE CHANGEOVER

1. CHECK NAME PLATE OF MACHINE FOR PROPER LINE VOLTAGE.
2. CONNECT CONTROL TRANSFORMER JUMPERS AS SHOWN IN APPROPRIATE FIG: FOR PROPER INPUT VOLTAGE.
3. CHECK YOUR LOCAL ELECTRICAL CODES FOR PROPER INPUT WIRE SIZE FOR LINE CURRENT SHOWN ON NAMEPLATE. IF NO CODE EXISTS THEN USE THE CHART IN THE "INSTALLATION" SECTION OF OWNER'S MANUAL.
4. CONNECT INPUT LINES TO MAIN POWER SWITCH AS SHOWN IN FIG: 3. (CAUTION – BE CERTAIN INPUT CIRCUIT IS OPEN BEFORE HANDLING LINE.)
5. CONNECT THE "POWER SYSTEM" GROUND TO THE SCREW MARKED FRAME GROUND ON THE YOKE.

NOTE;

Ⓐ 1. ANY CHANGES TO THIS DRAWING MUST BE REFLECTED ON DRAWING 204279.

159	8/92
159 TEST	8/92
OUTSIDE DISTR.	

DISTRIBUTION TABLE

CHANGE RECORD	
E.C. No.	DATE
A) 1422	5-20-97
B) 2150	5-19-98
AA	5-27-99

FILE NAME	PLOT DATE
204278	5-27-99

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES/MILLIMETERS TOLERANCES BELOW APPLY EXCEPT FOR VENDOR DESIGNED PARTS AND ITEMS. PRODUCED TO RECOGNIZED STANDARDS.

FRACT: INCH ± | ANGLES ± 3°

DECIMAL—INCH

.0 ± .1	0. ± 1.0mm
.00 ± .02	0.0 ± 0.4mm
.000 ± .003	0.00 ± 0.1mm

DO NOT SCALE DRAWING

FINISH CODE PER 800001: NONE

ACTIVITY	REPLACED BY	REPLACES
MATERIAL NO.	QUANTITY—U.M.	COMM. CLS.

MATERIAL SPEC.

TITLE: DIAGRAM, VOLTAGE CHANGEOVER

DESCRIPTIVE DATA

DESIGNED	DRAWN	DATE	SCALE
JAH	BAJ	8-17-92	FULL
CHECKED	APPROVED	RECORDS	ITEM TYPE
---	---	8-26-92	

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THERMAL ARC. A THERMADYNE Company TROY, OHIO 45373, U.S.A.

SIZE C | DWG. NO. 204278 | SHEET

Statement of Warranty

LIMITED WARRANTY: Thermal Arc®, Inc., A Thermadyne Company, warrants that its products will be free of defects in workmanship or material. Should any failure to conform to this warranty appear within the time period applicable to the Thermal Arc products as stated below, Thermal Arc shall, upon notification thereof and substantiation that the product has been stored, installed, operated, and maintained in accordance with Thermal Arc's specifications, instructions, recommendations and recognized standard industry practice, and not subject to misuse, repair, neglect, alteration, or accident, correct such defects by suitable repair or replacement, at Thermal Arc's sole option, of any components or parts of the product determined by Thermal Arc to be defective.

THERMAL ARC MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED. THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHERS, INCLUDING, BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

LIMITATION OF LIABILITY: Thermal Arc shall not under any circumstances be liable for special or consequential damages, such as, but not limited to, damage or loss of purchased or replacement goods, or claims of customers of distributor (hereinafter "Purchaser") for service interruption. The remedies of the Purchaser set forth herein are exclusive and the liability of Thermal Arc with respect to any contract, or anything done in connection therewith such as the performance or breach thereof, or from the manufacture, sale, delivery, resale, or use of any goods covered by or furnished by Thermal Arc whether arising out of contract, negligence, strike tort, or under any warranty, or otherwise, shall not, except as expressly provided herein, exceed the price of the goods upon which such liability is based. No employee, agent, or representative of Thermal Arc is authorized to change this warranty in any way or grant any other warranty.

PURCHASER'S RIGHTS UNDER THIS WARRANTY ARE VOID IF REPLACEMENT PARTS OR ACCESSORIES ARE USED WHICH IN THERMAL ARC'S SOLE JUDGMENT MAY IMPAIR THE SAFETY OR PERFORMANCE OF ANY THERMAL ARC PRODUCT.

PURCHASER'S RIGHTS UNDER THIS WARRANTY ARE VOID IF THE PRODUCT IS SOLD TO PURCHASER BY NON-AUTHORIZED PERSONS.

Except with regards to the products listed below, this warranty shall remain effective three (3) years from the date Thermal Arc's authorized distributor delivers the product to Purchaser, but in no event more than (4) years from the date Thermal Arc delivers the product to the authorized distributor.

Shorter warranty periods apply to the products listed below. On these products, the warranty is effective for the time stated below beginning on the date that the authorized distributor delivers the products to the Purchaser. Notwithstanding the foregoing, in no event shall the warranty period extend more than the time stated plus one year from the date Thermal Arc delivered the product to the authorized distributor.

POWER SUPPLIES	ALL OTHER POWER SUPPLIES	P-WEE, PRO-LITE PRO-PLUS, PRO-WAVE	LABOR
MAIN POWER MAGNETICS (STATIC & ROTATING)	3 YEARS	2 YEARS	1 YEAR
ORIGINAL MAIN POWER RECTIFIER	3 YEARS	2 YEARS	1 YEAR
CONTROL PC BOARD	3 YEARS	2 YEARS	1 YEAR
ALL OTHER CIRCUITS AND COMPONENTS INCLUDING BUT NOT LIMITED TO, CONTACTORS, RELAYS, SOLENOID, PUMPS, POWER SWITCHING SEMI-CONDUCTORS	1 YEAR	1 YEAR	1 YEAR
ENGINES: ENGINES ARE NOT WARRANTED BY THERMAL ARC, ALTHOUGH MOST ARE WARRANTED BY THE ENGINE MANUFACTURER. SEE THE ENGINE MANUFACTURES WARRANTY FOR DETAILS.			
CONSOLES, CONTROL EQUIPMENT, HEAT EXCHANGES, AND ACCESSORY EQUIPMENT	1 YEAR	1 YEAR	1 YEAR
TORCH AND LEADS	180 DAYS	180 DAYS	180 DAYS
REPAIR/REPLACEMENT PARTS	90 DAYS	90 DAYS	90 DAYS

Warranty repairs or replacement claims under this limited warranty must be submitted to Thermal Arc by an authorized Thermal Arc® repair facility within thirty (30) days of the repair. No transportation costs of any kind will be paid under this warranty. Transportation charges to send products to an authorized warranty repair facility shall be the responsibility of the customer. All returned goods shall be at the customer's risk and expense. This warranty supersedes all previous Thermal Arc warranties.

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